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PAVING SEWERAGE

MUNICIPAL ENGINEERING

WATERWORKS PARKS

A MONTHLY MAGAZINE.

DEVOTED TO THE IMPROVEMENT OF CITIES.

GOOD ROADS, STREET CONSTRUCTION,
CLEANING AND LIGHTING,
SANITATION,
BRIDGES.

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Municipal Engineering

VOLUME XIV. JANUARY, EIGHTEEN NINETY-EIGHT. NUMBER 1.

MUNICIPAL OWNERSHIP AND MUNICIPAL CONTROL.

By Charles Carroll Brown, M. Am. Soc. C. E.

In the numerous discussions of municipal ownership of various public and *quasi*-public works and of the question of construction by contract, or by the city forces directly, many of the debaters fail to see clearly the distinctions in the fundamental principles of the different activities, and so are led into contradictions and inconsistencies from which they are unable to extricate themselves. The question, "what works should be owned by the city, and what should, under no circumstances, be owned by the city?" has not yet been settled in all its details, even in theory. The practice has been so moulded by local conditions and interests that custom makes any change difficult, even when the theoretical considerations are indisputable. It is popularly supposed that municipal ownership of the streets is complete, or at least that the city has a control which is practically equivalent to ownership. There are some states, however, where this is far from being the case. Thus many cities in the east and those in some western states must wait until the property-owners on a street petition for its improvement and until they have had an opportunity to select the material, even when the improvement is almost entirely a public benefit and nearly all paid for by the city at large. In many cities the sidewalks are entirely under the control of the property-owners, the city being able to exert only police powers to prevent them from becoming dangerous to passers-by. In nearly all cities the lawns and trees are considered to be a portion of the abutting property and beyond general city control. Experience in cities where both driveway and sidewalk are under complete control of a city department, subject only to proper checks by the interested taxpayers against extravagance and dishonesty, demonstrates the advantages of this system, but custom is so strong that in some cities, where there is full power in the city departments, it is delegated to the property-owners. The effect of this policy in retarding the advance of the city in convenience and in appearance is obvious on the most cursory inspection.

Municipal ownership of the so-called natural monopolies is naturally and strongly advocated by many. Beginning with sewers, when used as street drains, also, and more largely for the benefit of the general public than of private individuals, this designation would include sewers used exclusively as

house drains, underground conduits, water-works, electric lighting plants, gas works, street railroads, telephone and telegraph lines, and such other methods of supply of the needs of the public as can not in their nature be open to development by any and every one desiring to enter the field. Bridges and docks are in a similar class. In all the cases mentioned, except, perhaps, main sewers, there are some instances of private ownership with municipal control, and many instances of private ownership with practically no municipal control beyond the regulation belonging to the so-called police powers of the state. The proportion of municipal ownership decreases as we go through the list, until we reach street railroads, when it becomes almost zero.

While the underlying principle, "natural monopoly," underlies all, the nature of the special service, the circumstances under which it was first begun and carried on, custom, all have their effect in modifying the conformity of practice with the bare theory. Street drains and sewers on the "combined" plan are constructed at public expense or turned over to the public with very few and small exceptions. The instances of private ownership of complete house drainage systems can be counted on the fingers, though there are many instances of private sewers serving a few properties in small towns and as branches to the public sewers in cities. As yet there are but few underground conduits, but unless they are constructed to expedite some other single service in the list, they are usually under municipal ownership or control.

The proportion of municipal water plants is increasing from year to year. In the smaller cities there is a kind of water-works plant which seems to be more satisfactory, practically, under honest private ownership, but the time for it is soon passed in a town of healthy growth. Electric lighting plants are such a modern invention that they are disposed to follow the logical process of municipal ownership, but they are subject to the same modifying conditions as the water-works plants, and also to the influence of the analogy with gas plants. For it is the exception that gas plants are subject to municipal ownership.

It will be noted that, roughly speaking, the proportion of municipal ownership diminishes as the relative number of men employed increases, and also (excepting street railroads), as the proportion of the population served decreases. Sewers are not an exception, as a large portion of their benefit is to the city at large. They are all natural monopolies, but all are not equally necessary to the average citizen, and as the need diminishes the need of city ownership diminishes.

Under the present conditions in American cities the fewer and smaller the departments the less scandal there will be in the politics of the city, but whenever the people demand better service and more honest servants the basic principle will show itself and increase its demands for consideration. The battle-ground just now between municipal and private ownership seems to be in the water-works item of the list with a constant gain for municipal ownership.

When we leave the field of natural monopolies and enter that where competition is possible, as the construction of sewers, pavements, their repair (except in minor details), cleaning of streets, and the like, we have a different

COLUMBUS AVE., BOSTON, SHOWING ASPHALT SURFACE AND CAR TRACKS.

problem to discuss. Here the present low condition of political morals make a dark shadow which obscures theoretical considerations and demands the reduction of the amount of actual construction of details of work by city employes to the lowest terms possible.

RELATIVE COST OF CONCRETE MIXTURES.

There is some discussion in Chicago of the relative values in foundations for pavements of eight inches of natural cement concrete and six inches of Portland cement concrete, but careful comparisons of the relative cost and strength of the two constructions have not appeared. The present specification calls for a mortar of one part of "Rosendale" cement and two parts of sand to be added to broken stone in sufficient quantity to bring a little free mortar to the surface in ramming. The amount of stone under the specification would be about four parts, or nearly twice the amount of mortar. If we assume the cement to cost 65 cents a barrel, the sand 50 cents a cubic yard and the stone $1 a cubic yard, the cost of a cubic yard of the concrete would be approximately the following—cost of delivery of materials and labor of mixing and laying being omitted, as they should be the same in all cases, very nearly:

2 barrels cement at 65 cents	$1 30
½ cubic yard sand at 50 cents	25
0.9 cubic yard stone at $1	90
Total cost of materials in 1 cubic yard concrete	$2 45

One square yard of foundation, six inches thick would then cost 41 cents, or eight inches thick would cost 54½ cents.

The concrete should be perfectly solid, so that the proportions of mortar and stone must remain the same under all changes of cement. If we assume a Portland cement costing $2 a barrel we will have the following results for various mixtures:

1 cement, 3 sand, 6 stone.

1 barrel cement at $2	$2 00
½ cubic yard sand at 50 cents	25
0.9 cubic yard stone at $1	90
Total cost of materials in 1 cubic yard concrete	$3 15

One square yard of foundation six inches thick would then cost 52½ cents.

1 cement, 3½ sand, 7 stone.

0.9 barrel cement at $2	$1 80
½ cubic yard sand at 50 cents	25
0.9 cubic yard stone at $1	90
Total cost of materials in 1 cubic yard concrete	$2 95

One square yard of foundation six inches thick would then cost 49 cents.

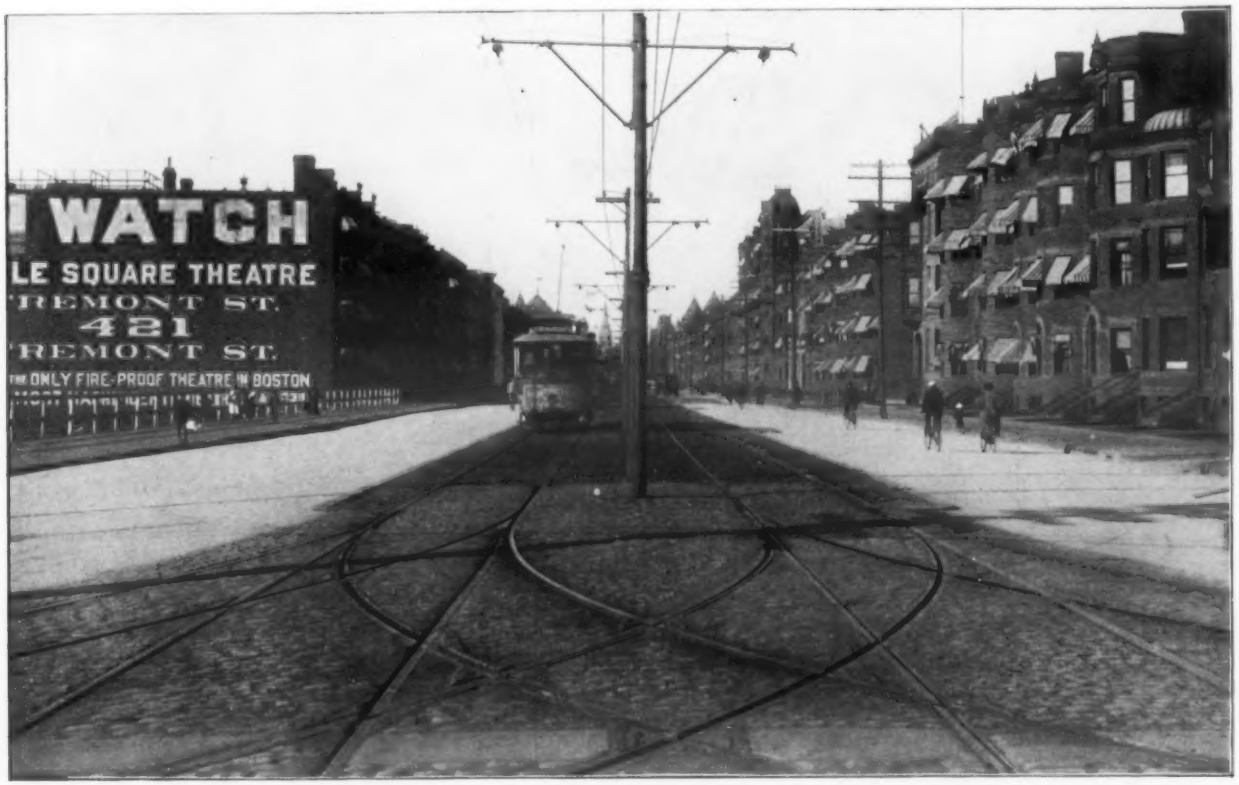
1 cement, 5 sand, 10 stone.

65 bbl. cement @ $2	$1 30
½ cu. yd. sand @ 50 cents	25
0.9 cu. yd. stone @ $1	90
Total cost of materials in 1 cu. yd. concrete	$2 45

One square yard of foundation 6 inches thick would then cost 41 cents.

These figures are approximate only, but serve to make a comparison of the relative cost of various mixtures. If sand and stone cost more than the prices given the cost of all the mixtures will be increased alike so that the differences in cost will remain the same. If the cost of the cements varies the comparison must be made anew.

For each cement chosen the questions to be decided are the cost of the various mixtures, the relative strength of the mortars, the



HUNTINGTON AVE. AT MASSACHUSETTS AVE., SHOWING ASPHALT SURFACE AND RESERVED SPACE.

relative value of the concretes, and whether the difference in cost of the stronger mixture is warranted by the increase in strength and durability.

Considerable foundation work for pavements has been laid in Portland cement. Statements of the relative quality of concrete of various proportions and with natural cement, and of the relative cost, as obtained from records of the actual work, would be very valuable to engineers generally, and MUNICIPAL ENGINEERING will be much pleased to receive them and publish those of interest.

APPARATUS AND METHODS FOR TESTING PORTLAND CEMENT.

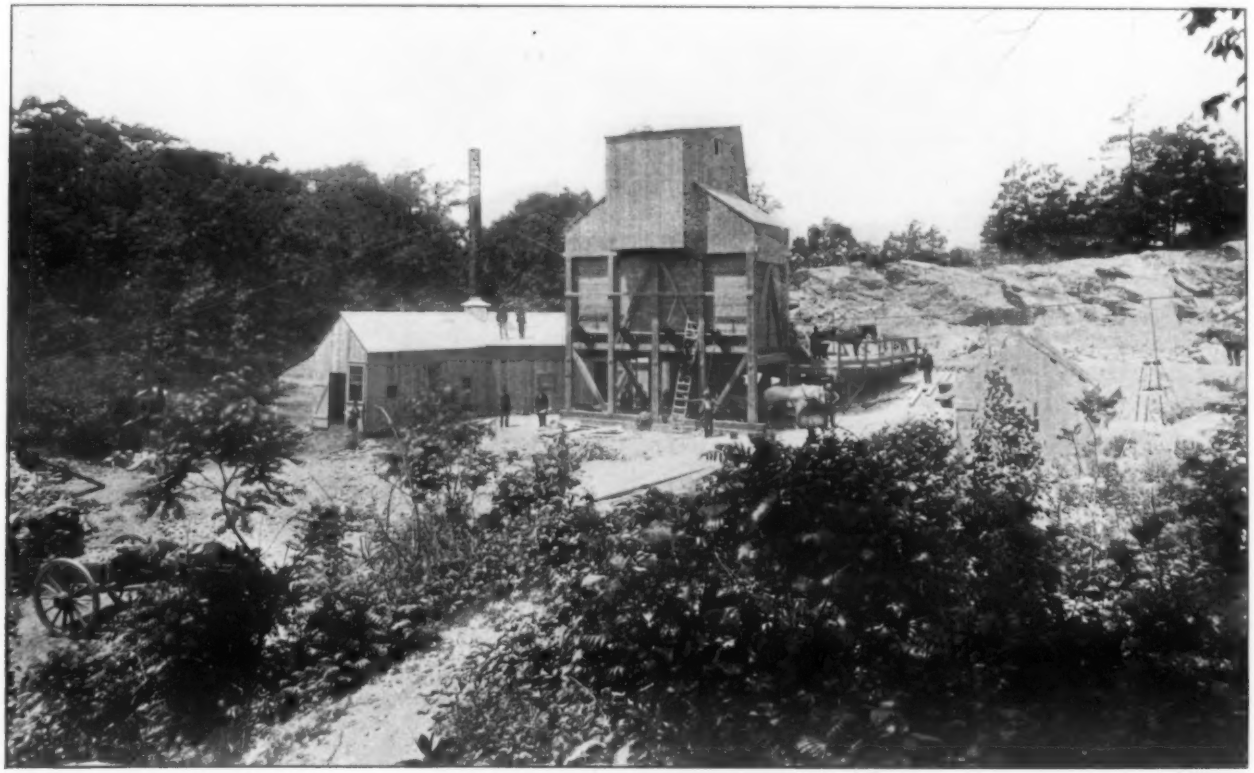
*By M. Gary.**

In view of the revision of the "Standards for the Uniform Testing of Portland Cement," by order of the Prussian ministry of public works, the Association of German Portland Cement Manufacturers has appointed a commission which has carried out some investigations in conjunction with the Royal Testing Laboratory at Berlin. The present paper describes the methods and apparatus in use at the royal laboratory, and suggestions for the improvement of the "Standards."

Time of Setting.—The "Standards" specify "the cement shall be mixed with water (from 27 per cent. to 30 per cent.) to form a stiff paste from which a cake 1.5 centimeter thick shall be made. As soon as the cake is sufficiently hard to resist a slight pressure with the finger nail the cement shall be considered set. Slow-setting cements shall be stirred for three minutes, quick-setting cements, one-minute." In the Royal Laboratory all cements are at first stirred three minutes. If any cement begins to set in less time, it is stirred one-and-a-half minutes, since experience has shown that no workman, however skilled, can uniformly mix 300 grams or 400 grams (10 ozs. or 14 ozs.) of cement with water in one minute. The quantity of water used in mixing has a great influence on the time of setting. At the Royal Laboratory the cement is mixed with water until it can run off from the mixing knife in long thin threads like syrup. This consistency can be determined so closely that, with practice, a difference of 0.5 per cent. of water can be observed. The quantity of water varies between 32 per cent. and 38 per cent. To this mixture dry cement is gradually added until it begins to collect in balls, when the pressure test is applied. The Vicat needle apparatus for the accurate determination of the time of setting is described. The influence of temperature and the hygrometric state of the air on the time of setting are discussed, together with the corresponding precautions taken at the Royal Laboratory.

Constancy of Volume.—The "Standards" specify: "Portland cement shall preserve constancy of volume. A thin cake made on a flat glass plate, kept in moist air for twenty-four hours, then placed

*Abstract from Proceedings Institution Civil Engineers, Vol. CXXVIII, page 368.



STONE CRUSHER, BLEITER'S LODGE, ROXBURY, MASS.

in water, shall afterwards show neither curvature nor cracks at the edges." Before immersion in water, the thin cakes made at the Royal Laboratory are kept in a zinc-lined box, the lid of which has on its inner side thick felt, which can be kept moistened with water. The covering of the test-cakes with damp cloths is not recommended.

Fineness of Grinding. — "Portland cement shall be ground so fine that a sample shall leave behind not more than 10 per cent. on a sieve of 900 meshes per square centimeter (5,800 meshes per square inch), the diameter of the wire being half the width of the mesh." At present it is impossible to obtain sieves to suit the requirements of the "Standards;" it would therefore be advantageous to order the sieve wire-gauze from one firm, so that uniformity may be attained. According to the "Standards," the width of mesh should be 0.222 millimeter, the diameter of the wire 0.111 millimeter. In the sieves used at the Royal Laboratory these dimensions are, respectively, 0.230 millimeter and 0.094 millimeter.

Strength Tests.—Test specimens, 5 square centimeters, and 50 square centimeters, sectional area, respectively, for tension and compression, are prepared at the Royal Laboratory by means of five Bohme hammer-machines. Years of experience have shown that the objections raised in some quarters against machine-made test-specimens can not be substantiated. The differences of the strengths of specimens prepared by the different hammers lie well within the allowable limits of error.

The arrangement of the mould, base-plate, and cover-box has great influence on the strength of the specimens produced. If the mould lies loose on the table while the ramming is going on, the material gets pressed between the top of the mould and its cover-box. Dr. Goslich designed an arrangement for clamping mould, base-plate and cover-box firmly together, and later Prof. Martens designed an improved and simplified apparatus, which can be quickly worked and easily cleaned. Experiments show that specimens consisting of 1 part cement and 3 parts sand made in the new moulds are 2.5 per cent. stronger in tension and 5 per cent. stronger in compression than specimens made in the old moulds, and that greater uniformity is attained with a number of similar specimens. The manner in which the ram is guided through the cover-box has an influence on the strength of specimens. After a number of experiments, a ram going quite loosely through the cover-box has been adopted.

The calibration of the Michaelis lever tension-machine and of the Amsler-Laffon 30-ton press is duly described.

"To ensure uniformity of results, the sand used shall be clean quartz sand, washed and dried, and which shall pass through a sieve of 60 meshes per square centimeter (387 meshes per square inch), but be retained by a sieve of 120 meshes per square centimeter (774 meshes per square inch). The wires shall be 0.38 millimeter and 0.32 millimeter diameter respectively." The sieves obtained in the usual way from the makers do not at all satisfy the requirements of the "Standards." Two sieves at the Royal Laboratory, each nominally 120-mesh, contain 121 and 129 meshes per square centimeter respectively, and pass 35.4 per cent. and 4.6 per cent. of normal sand.

Preparation of Cement-sand Speci-

D STREET, BOSTON, UNDER N. Y., N. H. & H. R. R., DURING A HEAVY RAIN.

mens.—The "Standards" specify a mixture of 250 grams cement, 750 grams sand, and 100 grams water. The Royal Laboratory find that in most cases 10 per cent. of water, as specified by the "Standards," is too much, as some of the finer cement particles are washed away by the excess of water, and the strength of the specimen is thereby reduced. Formulas for the quantities of water to be used in different cases are given.

AN OUTLINE OF MUNICIPAL LAWS GOVERNING PUBLIC WORKS.

To the Editor of Municipal Engineering:

I have just read in your December number the most excellent paper by David Molitor, C. E., and I ask that you publish his outline of a city charter. This, I think, is the true way to the best government.

JNO. R. TODD,
Water Department, Norfolk, Va.

Supplemental to the article of Mr. Molitor in the December number of this magazine on "Municipal Public Improvements and the Laws Governing Them," was submitted an outline by the author of what, in his judgment, would be the best form of municipal government for conducting public works. Space could not be given to this in the same number containing Mr. Molitor's general discussion of the subject, but, in compliance with the foregoing request, as well as others, it is set forth in full below:

—Organization of Board.—

1. All public improvements of whatever character must originate with and be executed under the supervision of a commission to be known as the board of public improvements.

2. This board shall be composed of a street commissioner, water commissioner, sewer commissioner, lighting and heating commissioner, commissioner of public buildings and a chief engineer of public improvements, who shall be president of the board. In case the city, at any time, becomes the owner of street railway lines, then there shall be added to the board a street railway commissioner.

3. The chief engineer of public improvements shall be elected by the qualified voters of the city and shall hold office for a term of four years, and until his successor shall be duly elected and qualified.

4. The mayor shall appoint the several commissioners of the board of public improvements, and a street railway commissioner, when this office shall become necessary, all of whom shall hold offices for terms of four years; provided, however, that the first appointments under this charter of street, water and sewer commissioners shall be for three years only and the first appointments of the heating and lighting commissioner and the commissioner of public buildings shall be for two years only.

5. Such appointments by the mayor shall require the confirmation of a majority of the members of the council, and it shall be the sacred duty of the council to establish whether or not nominees fill the express qualifications required by this charter, and if not, the council shall not confirm such appointment or appointments made contrary to such qualifications. Diversity in politics shall not be reason for refusal to confirm an appointment.

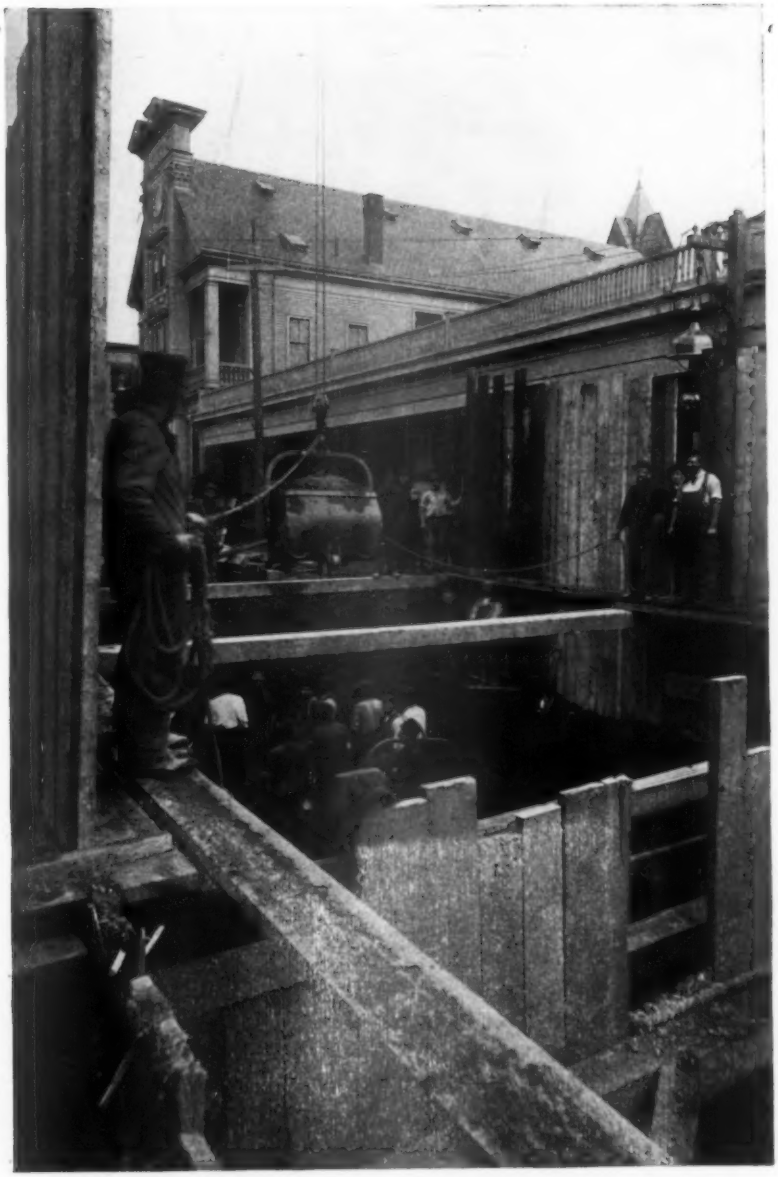
6. If the council shall refuse to confirm any appointments by the mayor for reasons to be stated in such refusal, then he shall, within ten days thereafter, nominate another person to fill such office, and he may continue to nominate until his nominee is confirmed. If the mayor fails to make another nomination within ten days from the rejection of a nomination, then the council shall elect a suitable person to fill the office during the term. Should the council fail to act on the mayor's nominee within ten days such nominee shall be considered confirmed. In every case the person shall be subject to removal as if appointed by the mayor.

—Removal from Office of a Member of the Board and Filling Vacancies—

7. Any member of the board of public improvements, including its president, shall be subject to removal from office for cause, in the manner herein provided.

8. In all cases of removal from office, the mayor shall present charges against such officer to the council and furnish a copy of same to said officer, who shall have the right to appear with a legal adviser before the council for his defense. Whenever such charges are brought by the council they must be presented through the mayor, who may or may not approve them. Any member against whom charges have been preferred shall thereby be suspended from office.

9. When charges have been preferred against a number of the board or its president the case shall be tried before the council without delay. The mayor shall read the charges to the council, and if, upon presentation of all arguments for the defense, the council shall, by resolution, supported by a two-thirds majority of all its members elected, sanction the charges as just and



TRENCH FOR STONY BROOK CONDUIT, COLUMBUS AVE., BOSTON.

sufficient to cause removal according to the requirements of this charter, then such member of the board shall thereby be removed from office. If, however, the charges are not thus sustained said member of the board shall be immediately reinstated.

10. When the charges for removal of a commissioner have been brought by the mayor and such charges shall have been sustained, then the council shall fill the vacancy by electing a duly qualified person to fill the place for the unexpired term. When the charges for removal of a commissioner have been brought by the council and such charges shall have been sustained, then the mayor shall fill the vacancy by appointing a duly qualified person to fill the place for the unexpired term, but no confirmation of the council shall be required. In either case the commissioner so elected shall be subject to removal as if appointed by the mayor.

11. Should the office of a commissioner become vacant by death or resignation the vacancy shall be filled in like manner as provided for the original appointment of such commissioner, but a commissioner so appointed shall hold office for the unexpired term only, unless he be reappointed at the time stated for such appointments.

12. Should the office of chief engineer become vacant by death, resignation or removal from office, the commissioners of the board shall, within ten days after a vacancy has occurred, nominate a duly qualified person for the office of chief engineer, to serve for the remainder of the unexpired term and until his successor is duly elected and qualified. The person so nominated must be confirmed by a majority of the council. Should such nominee fail to be confirmed the board shall continue to nominate until a confirmation can be obtained. Should the council fail to act on a nominee within ten days of his nomination such nominee shall be considered confirmed.

13. Should it prove impossible to fill a vacancy of any member of the board in the manner provided and within sixty days after such vacancy has occurred, the board shall elect a duly qualified person to serve for the remainder of the unexpired term, and such person will not require confirmation of either the mayor or the council.

—Qualifications of Members of the Board—

14. Every member of the board of public improvements shall possess the following qualifications: He shall be a citizen of the United States, but not necessarily a resident of the state and city wherein he is to serve. He shall not be directly or indirectly interested in any contract to which the city is a party, or in any department or institution thereof, and shall not be indebted to the state or city on account of any tax. He shall not have been convicted of malfeasance in office, bribery or other corrupt practices or crimes.

15. The chief engineer of public improvements shall, in addition to the above, possess the following qualifications: He must be at least thirty-five years of age, must have practiced the civil engineering profession for at least ten years and have had responsible charge of engineering work for at least six years. He must possess satisfactory testimonials that he fills the requirements and must be indorsed by an engineering school of good standing in the United States or be a full member of the American Society of Civil Engineers.

16. The street, water and sewer commissioners shall possess the following additional qualifications: They shall be at least thirty years of age, must be civil engineers by profession and must have been engaged in engineering work for at least seven years and have had responsible charge of such work for at least four years. They must possess satisfactory testimonials to this effect and must be indorsed by an engineering school of good standing or be full members of the American Society of Civil Engineers.

17. The lighting and heating commissioner shall possess the following additional qualifications: He must be at least thirty years of age, must be a mechanical or electrical engineer by profession and must have been engaged in engineering work for at least seven years and have had responsible charge of such work for at least four years. He must possess satisfactory testimonials to this effect and must be indorsed by an engineering school of good standing or be a full member of the American Society of Mechanical Engineers, or of the American Institute of Electrical Engineers.

18. The commissioner of public buildings shall possess the following additional qualifications: He must be at least thirty years of age, must be an architect by profession, must have been engaged on architectural work for at least seven years and have had responsible charge of the design and construction of first-class buildings for at least four years.

19. The street railway commissioner, in case such commission be created by the council and approved by the mayor, shall possess the following additional qualifications: He must be at least thirty years of age, must be a mechanical or electrical engineer by profession, etc., as required for the lighting and heating commissioner.

20. The chief engineer of public improvements, before entering upon the discharge of the duties of his office, shall give bond and security to the city, to the satisfaction of the mayor, in the sum of ten thousand dollars, conditioned that he will faithfully perform all the duties of his office according to the charter and law, and each commissioner shall, in like manner, give bond and security in the sum of five thousand dollars.

21. Before any member of the board of public improvements can enter on or perform the duties of his office, he must take and subscribe an oath before the register (who shall file the same in his office), that he possesses all the qualifications required in this charter, and is not subject to any of the disqualifications therein named, submitting also such testimonials as have been mentioned (to be filed with the oath and returned at the expiration of the term of office), and that he will support the constitution of the United States and of this state, and will faithfully discharge the duties of his office as specified in this charter, subject to amendments that may be made. The inability of any incumbent to fully comply with the requirements of this paragraph shall cause the register to declare such office vacant, and such vacancy shall be filled in the manner provided for in case of death or resignation.

22. Any member of the board who shall, at any time during his term of office, cease to

NORMANDY STREET SEWER, BOSTON, SHOWING COMPARATIVE SIZES OF HOUSE AND STORM SEWERS.

possess any of the qualifications named in this charter or amendments thereto shall thereby forfeit his office and the same shall be filled in the manner provided for in the case of death or resignation.

23. Any member of the board or subordinate thereunder, who shall, except when physically unable or during leave of absence properly granted, fail to devote his entire services during business hours, established by ordinance, to the duties of his office shall be removed in the manner provided for.

24. The chief engineer shall have power to grant leave of absence to any commissioner for a period not exceeding thirty days in any one year, upon written application of such member. In case of the chief engineer, the mayor shall have the power to grant leave of absence.

25. Any commissioner shall have power to grant leave of absence to any of his subordinates for a period not exceeding fifteen days in any one year, upon written application of such subordinate, which application must be placed on file with the records of the board.

26. In case of absence for sickness or otherwise of any member of the board or any subordinate thereunder, the board shall have the right to adopt such measures or make such disposition of the duties devolving upon such absent member or subordinate as it may deem necessary.

—Duties of the Board of Public Improvements—

27. The board of public improvements shall meet at least once in each week at its office to consider and take under advisement such business as may come before it. The chief engineer shall preside at all meetings of the board and shall call such extra meetings as he may deem necessary.

28. A majority of the board shall constitute a quorum for the transaction of business, but no final action shall be taken in any matter concerning the special department of any absent commissioner, unless this business has been previously made the special order of the day.

29. The board shall furnish through its president to the mayor such data or information as may be required, or which it may, from time to time, deem necessary to impart.

30. The mayor, or the municipal assembly through the mayor, may require the action of the board on any question relating to public improvements, and all ordinances or franchises granted to any person or corporation by the city and involving questions of an engineering character shall be submitted to the board for recommendations and approval before becoming law.

31. The president of the board shall have charge of all public improvements not otherwise provided for and shall have general supervision over the departments of all the commissioners, and shall inform the mayor of any dereliction of duty of any commissioner.

32. The president of the board shall submit a report annually to the mayor, which report shall be submitted by the mayor with his message to the assembly. Such annual report shall have appended annual reports of each of the commissioners and shall contain a full itemized account of all money placed to the account of public improvements and paid out by or through said department. It shall set forth in detail the condition of the public works or improvements of the city, under appropriate headings, and description of each contract, the names of the contractors, the authority for and amount appropriated to each piece of work or contract, the amount paid thereon prior to the last annual report, if any, the amount since, and an estimate of the amount necessary to complete the same; how much, for what purpose, and under what authority or appropriation expenditures have been made without written contract, and all other things in the department of interest to the administration and the public.

33. The president shall submit a quarterly report to the comptroller giving a full itemized account of receipts and expenditures of the department, and the books, papers and everything connected with the board shall be open for examination and inspection by any member of the assembly, the mayor or the comptroller.

34. The municipal assembly may impose, by ordinance, such additional duties of, and requirements from, the board of public improvements and its several members as it may deem necessary, but shall not directly enter into any contract or agreement for public improvement or for the maintenance of any public works, nor fix the price or rate therefor.

35. All money for public improvements or for the maintenance of public works shall be appropriated by the municipal assembly subject to the conditions of this charter. But all ordinances for public improvements or for the maintenance of public works must be prepared and recommended by the board of public improvements, and the assembly shall not alter or amend such ordinances without the approval of the board. Any ordinance not adopted by the assembly shall be returned to the board with such recommendations as may be deemed necessary.

36. The mayor, the municipal assembly or citizens shall have the right to petition the board of public improvements to prepare and submit to the assembly for approval such ordinances for public improvements as may be necessary or desirable, and ordinances so prepared shall set forth in full the names of all parties who have petitioned for such improvements.

37. All ordinances recommended by the board shall specify the character of the work, its extent, the material to be used, the manner and general regulations under which it shall be executed and paid and shall be indorsed with the estimate of the cost thereof; provided, that no improvement or repairs shall be ordered upon any future street, alley, highway, place or park, which shall not have been opened, dedicated or established according to the provisions of this charter and law.

38. The board of public improvements shall, in all cases, except in cases of emergency requiring prompt attention and works of repair, prepare and submit to the assembly an ordinance for the proposed work, and under such ordinance when approved by the assembly and the necessary funds are appropriated therefor, shall advertise for proposals as provided for and let out said work by contract to the lowest responsible bidder. Any other mode of letting out work, except

QUINCY STREET, CHARLESTOWN, MASS., SHOWING ARTIFICIAL STONE RETAINING WALLS STEPS AND PLATFORMS.

in cases just named, shall be held as illegal and void.

—Powers and Duties of the Members of the Board—

39. The commissioners of the board of public improvements shall be the heads of their several departments and shall be responsible for all actions of their employes so far as these relate to the duties of such employes.

40. Each commissioner, including the chief engineer of the board, must obtain from the board authority for engaging such assistants, clerks and inspectors as may be necessary or as the work in hand may require, but each commissioner shall be the sole judge of the qualifications of the assistants, clerks and inspectors in his department and shall have the right to appoint and discharge any of them except for political reasons. Each subordinate must be a citizen of the United States, but no conditions of residence in the city shall be required.

41. The assistants, clerks and inspectors appointed by any member of the board shall be selected from among persons who have successfully passed an examination, under such rules and regulations as may be adopted by the board.

42. In advertising for proposals, the commissioners having charge of the particular work proposed, shall prepare the advertisement and specifications, which shall be read before and approved by the board. When thus approved, the advertisement shall be published in at least three daily papers in the city and in at least three engineering papers, at such time previous to letting the contract as will allow intending bidders ample opportunity to prepare proposals.

43. All advertisements shall read as follows:

"Sealed proposals for —— will be received at the office of the board of public improvements until 2 p. m., standard time, ——, and then publicly opened. All information will be furnished on application."

44. All specifications issued by the board shall contain the following:

—General Instructions and Conditions—

1. All contracts to which the city is a party shall be subject to the conditions of the city charter and to law.

2. Preference will be given to articles or materials of domestic production. The importation of foreigners and aliens, under contract or agreement, to perform labor in the city is prohibited.

3. No proposal will be considered unless accompanied by a certified check in an amount equal to twenty per cent. of the amount of the bid; such check will be returned to all except the bidder to whom award is made.

4. All bids must be made in triplicate, upon printed forms to be obtained at this office.

5. All signatures in proposals and contracts should be written out in full, and each such signature should be attested by at least one witness, and when practicable by a separate witness to each signature.

6. A proposal by a corporation must be signed with the name of such corporation, followed by the signature of the president, secretary or other person duly authorized to bind such corporation, who should file evidence of his authority for so doing. A proposal by a firm must be signed with the name of the firm, either by a member thereof or by its authorized agent, giving the name of all members of the firm. Any one signing the proposal as the agent of another, or others, must file with it legal evidence of his authority to do so. A proposal signed by a person without disclosing the firm or corporation which he may represent is the proposal of the individual.

7. The place of residence of each bidder, and postoffice address, with county and state, must be given after his signature.

8. All prices must be written as well as expressed in figures.

9. The advertisement with specifications and blank forms for proposal can be obtained at this office on application by mail or in person. Three such copies, when properly filled out, will constitute the proposal which will be attached to the contract, signed in triplicate, and form a part of the contract.

10. One copy of each contract, when executed and approved by the board, shall be on file in the office of the board, one with the register, and one shall become the property of the contractor.

11. Proposals must be prepared without assistance from any person employed in or belonging to the service of the city or employed under this office.

12. No bidder will be informed, directly or indirectly, of the name of any person intending to bid or not to bid or to whom information in respect to proposals may have been given.

13. All blank spaces in the proposal must be filled in, and no change shall be made in the phraseology of the proposal, or addition to the item mentioned therein. Any conditions, limitations or provisions attached to proposals will be liable to render them informal and cause their rejection.

14. Alterations by erasure or interlineation must be explained or noted in the proposal over the signature of the bidder.

15. If a bidder wishes to withdraw his proposal, he may do so before the time fixed for the opening, without prejudice to himself, by communicating his purpose in writing to the board of public improvements, and, when reached, it shall be handed to him or his authorized agent unread.

16. Reasonable grounds for supposing that any bidder is interested in more than one bid for the same item, will cause the rejection of all bids in which he is interested.

17. Bids received after the time set for opening of proposals will not be considered.

18. Proposals must be placed in a sealed envelope marked "Proposals for ——," and inclosed in another sealed envelope addressed to the board of public improvements.

19. The board of public improvements reserves the right to reject any and all bids, and to waive any informality in the bids received; also to disregard the bid of any failing bidder or contractor known as such to the board.

20. The bidder to whom award is made will be required to enter into written contract with the city within ten (10) days after being notified of the acceptance of his proposal. The certified check submitted with the bid will be deposited with the city comptroller and withheld until proper and satisfactory completion of the contract and until final estimate is rendered and approved by the board.

21. The contract which the bidders promise to enter into shall be, in its general pro-

visions, in the form adopted by the board, blank forms of which can be inspected at this office, and will be furnished if desired, to parties proposing to submit bids. Parties making bids are to be understood as accepting the terms and conditions contained in such form of contract.

22. Bidders are invited to be present at the opening of the bids.

23. Transfers of contracts, or of interests in contracts, are prohibited.

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45. Advertisements and specifications, when approved by the board, shall be printed together with blank forms for proposals, all of which shall be combined in one document to be furnished free to intending bidders on application.

46. It shall be the duty of each commissioner and of the president of the board to see that all contracts and agreements with the city and relating to work in his department, are faithfully performed and kept, and to this end shall stipulate fines in the contract, and if necessary, upon consultation with the mayor, the board shall cause legal proceedings to be instituted and prosecuted against all persons or corporations failing to fulfill their agreements with the city.

47. The municipal assembly and the mayor are hereby prohibited from granting relief to contractors or from releasing them from any fines or penalties incurred under contracts, except on the unanimous recommendation of the board.

48. The street commissioner shall have under his special charge: a, the city surveying; b, streets; c, parks and public places; d, bridges, and e, public docks and harbors.

a. The city surveying shall include making and keeping corrected plats of the city, showing all streets, public places, alleys, parks, buildings, water courses, sewers, pipe lines, car tracks and such other features as may be necessary and desirable in connection with the preparations of such plats. It shall also include establishing and giving lines and grades for all work connected with the construction or reconstruction of streets, boulevards, alleys, public places and parks and keeping records of all such work. Also making surveys and plans for record and improvement of all public property bought, sold or exchanged by the city. Also looking up the titles, preparing deeds and placing stone bounds to mark the corners of lands owned or to be owned by the city.

(b.) Work relating to streets shall include the preparation of plans and specifications for and the superintendence of construction, reconstruction, repairs, sweeping and scavenging of all streets, boulevards, alleys and places; also providing and maintaining all crosswalks and sidewalks belonging to the city and keeping the same clean from snow; also providing and maintaining street signs and other notices and public lavatories; the regulation of transportation, railways, switches and all other services by corporations occupying public streets, alleys and places. The opening of new streets shall be conducted in a manner to be provided by ordinance.

(c.) The work relating to parks and public places shall include the preparation of plans and specifications for and superintendence of all work connected with city parks, except bridges located therein, and shall include laying out and improving new parks that may become city property and maintaining all in good order. It shall include a general supervision over all city parks, except the revenue that may result therefrom.

(d.) The work relating to bridges shall include the preparation of plans and specifications for and superintendence of all city bridges. It shall include the maintenance and annual inspection of all such bridges and the keeping of a complete record of the results of such inspection.

(e.) The work relating to public docks and harbors shall include the preparation of plans and specifications for and superintendence of the construction, reconstruction and repair of all public docks and harbors.

49. The water commissioner shall have under his special charge: (a) The city water works; (b) the water supply pipes; (c) the purification system. He shall also be chief adviser in all engineering matters relating to the fire department.

(a.) The work relating to water works shall include the preparation of plans and specifications for and superintendence of the construction, reconstruction and repairs of the pumping plant, reservoirs and all appurtenances to water works, except pipe lines; it shall also include the maintenance and operation of such plant. It shall include a general supervision over all property connected with the water works, but not the assessment and collection of water rates.

(b.) The work relating to water supply pipes shall include the preparation of plans and specifications for and superintendence of the construction, reconstruction and repairs also the maintenance of all pipe lines and appurtenances, necessary to provide the city with an adequate supply of water.

(c.) The work relating to the purification system shall include the preparation of plans and specifications for and superintendence of the construction, reconstruction and repairs of the necessary settling basins and filtration plant. It shall also include the maintenance and operation of this plant.

50. The sewer commissioner shall have under his special charge all work relating to the public sewerage disposal system, including the preparation of plans and specifications for and superintendence of the construction, reconstruction and repairs, also the maintenance of all sewers, inlets, manholes and other plant and appurtenances belonging thereto, except private sewers. Also the operation of a possible sewerage disposal plant which may be constructed under this department. All matters relating to private sewers shall be regulated by the sewer commissioner.

51. The commissioner of lighting and heating shall have under his special charge: (a) The city lighting; (b) public heating plants: (c) the regulation of construction of subways or conduits, overhead wires and supports, etc., and (d) the approval of all boilers or heating plants within the city limits in respect to smoke prevention.

(a.) The work pertaining to the city lighting shall include the preparation of plans and specifications for and superintendence of the construction, reconstruction and repairs of the city lighting plant for the manufacture and distribution of the lighting material to properly illuminate the streets, boulevards, public places, parks, buildings and bridges.

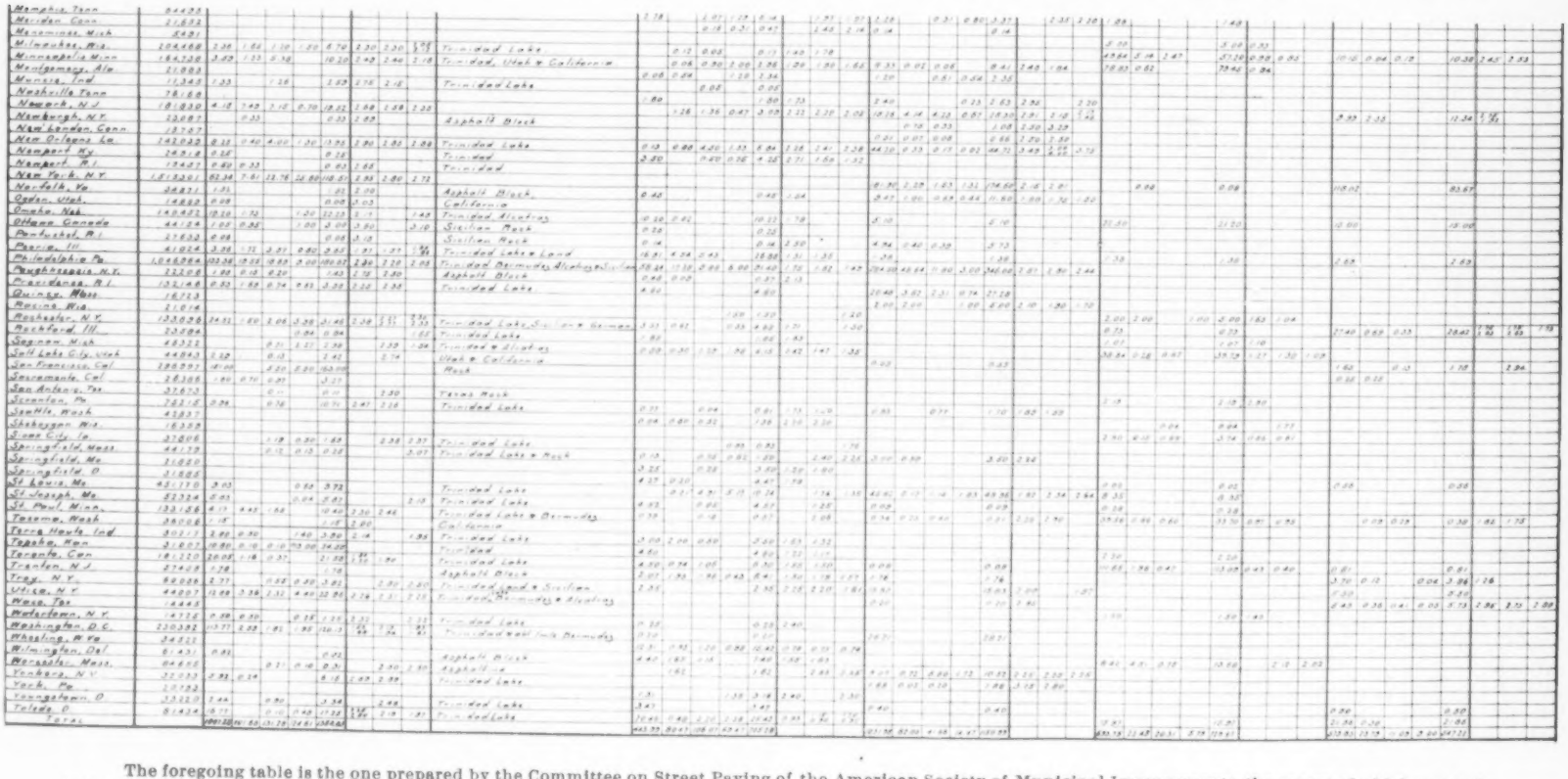
Committee on Street Paving — A. D. Thompson, Peoria Ill. N. P. Lewis, Brooklyn, N.Y.

Table showing the kind, amount and cost of Pavements in different cities of the United States and Canada.

— November 1897 —

Name of City	Population Census 1890	Asphalt: Sq. yds. 1895	1896	1897	Total	Cost per Sq. yd. 1895	1896	1897	Kind of Asphalt used	Brick: Sq. yds. 1895	1896	1897	Total	Cost per Sq. yd. 1895	1896	1897	Granite: Sq. yds. 1895	1896	1897	Total	Cost per Sq. yd. 1895	1896	1897	Wood: Sq. yds. 1895	1896	1897	Total	Cost per Sq. yd. 1895	1896	1897	Sandstone or Trap: Sq. yds. 1895	1896	1897	Total	Cost per Sq. yd. 1895	1896	1897
Allegheny Pa	113,628																																			
Albany N.Y.	94,923																																			
Allegheny Pa	105,287	2,350	1,000	9,000	12,350	$1.92	$1.93	$1.91	Trinidad Lake, Bermudez & Asphalt																											
Alton Ill	10,294																																			
Altoona Pa	30,337	8,250	2,000		10,250		1.98		Trinidad Lake																											
Amsterdam N.J.	21,374	200			200		2.90																													
Ann Arbor Mich	9,643																																			
Atlanta Ga	65,533	1,200		1,200					Trinidad	1,200					2.50	2.00																			
Augusta Ga	33,300	200		1,400	1,600																															
Baltimore Md	434,439	3,350		2,000	5,350	2.00	2.00	2.00	Trinidad & Alcatraz	2,500			2,500	2.00			11,000			11,000	2.00														
Binghamton N.Y.	35,005	3,800	1,000	1,000	5,800	1.80	1.80	1.80	Trinidad Lake	1,000			1,000	1.80			11,000			11,000	2.00														
Bloomington Ill	20,484									1,200	2,000	3,000	6,200	1.80	2.00	2.00	1,000	2,000	3,000	6,000	1.80	2.00	2.00													
Braddock Pa	12,142									300	1,200	1,400	2,900	1.80	2.00	2.00	500	1,200	1,700	3,400	1.80	2.00	2.00													
Brooklyn N.Y.	806,343	1,400	2,000	10,000	13,400	2.00	2.00	2.00	Trinidad Lake & Island Alcatraz, Bermudez & Lobitos		1,000	2,000	3,000	2.00	2.00	2.00	20,000	10,000	2,000	32,000	2.00	2.00	2.00													
Buffalo N.Y.	255,664	12,000	12,000	2,000	26,000	2.00	2.00	2.00	Trinidad, Kentucky, Bermudez & Scranton	3,000	1,000	2,000	6,000	2.00	2.00	2.00	1,000			1,000	2.00														
Cambridge Mass	70,028		1,000		1,000		3.00		Trinidad								1,000			1,000	2.00														
Camden N.J.	20,045	3,000			3,000		1.50		Compressed Block	2,000			2,000	2.00			2,000	1,000	2,000	5,000	2.00	2.00	2.00													
Carbondale Pa	10,000									1,200			1,200	2.00																					
Cedar Rapids Mich	10,000									4,000	2,000	2,000	8,000	2.00	2.00	2.00								2,000			2,000								
Charleston S.C.	54,955	2,000	2,000		4,000	2.00	2.00		Trinidad																											
Cincinnati O.	296,908	17,000	20,000	10,000	47,000	2.00	2.00	2.00	Trinidad Lake & Island Alcatraz & Bermudez	2,000	2,000	2,000	6,000	2.00	2.00	2.00	2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000			1,000	2.00								
Cleveland O.	261,353	3,000	2,000	1,000	6,000	1.95	1.90	1.85	Trinidad Lake	1,000			1,000	1.95			2,000			2,000	2.00														
Clinton Ia	7,863									1,000			1,000	2.00																					
Columbus O	88,150	17,000	2,000	2,000	21,000	1.95	1.90	1.85	Trinidad Lake, Kentucky, Vitrified Brick	2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000			1,000	2.00														
Covington Ky	37,371	2,000			2,000	2.00			Trinidad Lake		2,000		2,000	2.00										1,000			1,000	2.00								
Dallas Tex.	38,067									1,000	2,000	2,000	5,000	2.00	2.00	2.00																			
Davenport Ia	26,872									2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000	1,000	2,000	4,000	2.00	2.00	2.00													
Dayton O	61,220	12,000	8,000	2,000	22,000	2.07	2.00		Trinidad Lake	2,000	2,000	2,000	6,000	2.00	2.00	2.00	2,000			2,000	2.00														
Denver Col.	106,713	4,000		2,000	6,000	2.00	2.00	2.00	Trinidad Lead, Lobos & Bitulithic																											
Detroit Mich.	205,876	17,000	8,000	6,000	31,000	2.00	2.00	2.00	Trinidad	2,000	2,000	2,000	6,000	2.00	2.00	2.00	2,000			2,000	2.00														
Dubuque Ia.	30,311									2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000			1,000	2.00														
Duluth Minn.	33,115									1,000			1,000	2.00																					
Easton Pa	14,481									400			400	2.00																					
Eau Claire Wis	17,415											2,000	2,000			2.00																			
Elmira N.Y.	30,823		2,000		2,000		2.00		Trinidad Lake	800	1,000	1,000	2,800	2.00	2.00	2.00																			
Erie Pa	40,634	2,000	2,000	1,000	5,000	2.00	2.00	2.00		1,000	1,000	1,000	3,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00													
Evansville Ind.	21,830									1,000	2,000	2,000	5,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00													
Fond du Lac Wis	12,974									1,000			1,000	2.00																					
Fort Wayne Ind.	35,393	2,000			2,000				Trinidad Lake	2,000	1,000	1,000	4,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00													
Galesburg Ill	18,754									1,000	2,000	2,000	5,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00													
Gloversville N.Y.	13,864									1,000	2,000	2,000	5,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00													
Grand Rapids Mich	60,278	2,000		2,000	4,000	2.00	2.00	2.00	Trinidad, California, Utah	2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00													
Harrisburg Pa	23,256	2,000		2,000	4,000	2.00	2.00	2.00	Asphalt Block																											
Haverhill Mass	27,412																2,000	2,000	2,000	6,000	2.00	2.00	2.00												
Hoboken N.J.	43,648		2,000		2,000	3,000			Trinidad Lake, Maricaibo & Alcatraz																											
Holyoke Mass	21,837	2,000	2,000		4,000	2.00	2.00		Asphalt Block																											
Hornellsville N.Y.	10,996										2,000	2,000	4,000	2.00	2.00	2.00	2,000	2,000	2,000	6,000	2.00	2.00	2.00												
Jackson Mich.	20,798									2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00												
Jamestown N.Y.	16,038									1,000	2,000	2,000	5,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00												
Jersey City N.J.	163,003	1,200	2,000	3,000	6,200	2.00	2.00	2.00	Trinidad Lake & California Lead	2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00												
Kansas City Kan.	38,316	1,000			1,000				Trinidad Lake	2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00												
Kansas City Mo	132,716	10,000	6,000	8,000	24,000	2.00	2.00	2.00	Trinidad Lake & American Rock	12,000	10,000	6,000	28,000	2.00	2.00	2.00	2,000	2,000	2,000	6,000	2.00	2.00	2.00												
La Crosse Wis	14,505									1,000	2,000	2,000	5,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00												
Lafayette Ind.	18,243																																			
Lawrence Mass	44,654									2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00												
Leavenworth Kan	19,782																																			
Lima O	14,281			1,000	1,000			1.85	California & Lima Rock	2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00												
Lincoln Neb	55,154									3,000			3,000	2.00			1,000			1,000	2.00														
Louisville Ky	161,129	8,000	6,000	6,000	20,000	2.00	2.00	2.00	Trinidad Lake, Kentucky, Vitrified Brick, Lobitos & Bermudez	2,000	2,000	2,000	6,000	2.00	2.00	2.00	1,000	1,000	1,000	3,000	2.00	2.00	2.00												
Los Angeles Co.	50,395	1,200		2,000	3,200	2.07	2.07	2.00	California	2,000			2,000	2.00			1,000			1,000	2.00														
Lowell Mass	77,696	2,000			2,000	2.00		1.85	Asphaltina																											
Lynn Mass	38,727																																			

CONTINUATION OF TABLE SHOWING KIND, AMOUNT AND COST OF PAVEMENTS IN DIFFERENT CITIES OF THE UNITED STATES AND CANADA.



The foregoing table is the one prepared by the Committee on Street Paving of the American Society of Municipal Improvements, the report of which was published in full, with the exception of this table, in the December number, 1897, of MUNICIPAL ENGINEERING MAGAZINE.

It shall also include the maintenance and operation of such plant. Should the city construct or become owner of a plant for supplying private dwellings with gas or electricity, the same shall be included in and operated under the supervision of this department, except the assessment and collection of the rates therefor.

(b.) The work pertaining to the city heating shall include the preparation of plans and specifications for and superintendence of the construction, reconstruction and repairs of the city heating plant or plants, for the generation and distribution of heat in all public buildings belonging to the city, excluding the operation of such plant or plants.

(c.) This department shall also regulate the construction of subways or conduits, overhead wires and supports, and shall issue and cause to be enforced such measures as may be necessary for the public safety as affected by the distribution and use of electricity, gas and steam.

(d.) The approval of this department as to smoke prevention must be obtained prior to installation and operation of any boiler or heating plant within the city limits. Failure to comply with this requirement will, in case of smoke nuisance, cause shutting down of such plant until the nuisance is abated.

52. The commissioner of public buildings shall have under his special charge the preparation of plans and specifications for and superintendence of the construction, reconstruction and repairs of all buildings owned or to be owned by the city and shall have a general supervision over the same. It shall be the duty of this commissioner to inspect all public buildings at least once in every calendar year or when required by the mayor and he shall keep a complete record of all such inspections. He shall also prepare and submit to the municipal assembly, without necessary delay, an ordinance containing stringent and efficient laws for securing the safety of persons from injury by fire in halls and buildings let or used for public assemblies and for entertainments or amusements and shall, when such ordinance shall have become law, cause all property-holders found violating such law to be fined or to close such buildings for the purposes above mentioned until the necessary requirements are complied with. This department shall prepare an ordinance for such building regulations as are necessary and expedient, stipulating appropriate fines for violations thereof.

53. The street railway commissioner, should such office become necessary and an appointment to fill the same be made as provided, shall have under his special charge the preparation of plans and specifications for and superintendence of the construction, reconstruction and repairs of all street railways owned or to be owned by the city, including the maintenance and operation thereof. He shall not fix the rate of fare nor collect the revenue resulting therefrom.

—Compensation of Members of the Board—

54. The chief engineer of the board of public improvements shall receive for his services five thousand dollars ($5,000) per year, payable monthly.

55. Each commissioner of the board of public improvements shall receive for his services three thousand five hundred dollars ($3,500) per year, payable monthly.

56. The compensation of assistants, clerks and inspectors employed under the board of public improvements shall be proposed by the commissioner under whom they are to serve and recommended to the board at the time when authority for engaging such services is requested and the board shall, when granting authority for engaging the services of assistants, clerks and inspectors, also fix the compensation which each is to receive.

57. The compensation of assistants shall never exceed two thousand and four hundred dollars ($2,400) per annum, and of clerk and inspectors it shall never exceed fifteen hundred dollars ($1,500).

58. The assessment and collection of all moneys resulting in a revenue from the various works under the supervision of the board of public improvements shall be conducted by such person or persons, in such manner, under such laws and regulations and the revenue collected be appropriated to such purposes all as prescribed by this charter or to be determined by ordinance.

The following papers afforded the writer very valuable suggestions and ideas which were utilized, together with his own experience gained in practicing the engineering profession both in the United States and in Europe, in the compilation of the above work:

1. The Charter of the City of St. Louis, Mo., 1876.

2. Government of Cities in the United States—Century Mag., 1891.

3. Our Remedy for Municipal Government—C. W. Eliot in Forum, 1891.

4. The Management of Municipal Public Works in St. Louis, Mo., by Robert Moore, C. E.

5. Lecture delivered by Mr. R. E. McMath, C. E., before the Association of Graduate Engineers, Cornell university.

SANITARY ADVANCES IN MUNICIPAL ENGINEERING IN ENGLAND.

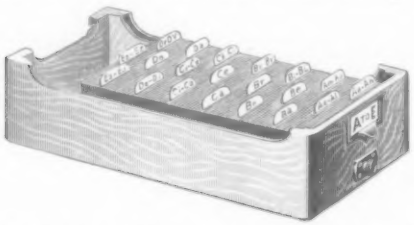
In a recent address before the British Association of Municipal Engineers, Mr. H. Percy Boulnois, M. I. C. E., ex-city engineer of Liverpool, said that the municipal engineer, or town surveyor, was practically unknown in England before the Queen came to the throne. Much had been accomplished in the face of great opposition during this comparatively short period. Some of the difficulties are commonly experienced in America. Municipal government theoretically was splendid; practically, it often failed. It failed principally because that government was ever changing. As each succeeding November came round fresh men took seats on the controlling bodies. The consequence was that the municipal engineer had no sooner educated one committee to a proper standard than he had to start to educate another. This was very much against advancement. Then, again, in small towns men got into municipal bodies very often for purposes of their own. It had been found that a ready "spouter" was more likely to be elected than a man who had the interests of the place at heart but who could not speak very well.

Education was first, legislation afterwards. Sewerage used to be exceedingly defective. The drains were badly constructed—mere elongated cesspools. But the municipal engineer had changed all that. He had taken up the matter scientifically. He had properly graded the drains, and consequently large communities were now able to live together with almost perfect immunity from disease. He drew attention to the difficulties experienced in ensuring that sewers shall be self-cleansing, and described the various methods of flushing which have been adopted. By means of automatic flushing tanks placed at the head of the sewers, or by large tanks which might be placed over the sewer manholes, the whole of the contents could be passed into the sewer. A tank of this description, which could pass 2,000 gallons of water to the sewer in thirty seconds, was shown on a screen. Liverpool flushed all its sewers, including those of private houses, large and small, twice a year, at a cost to the local authority of over £4,000 per annum for private flushing alone. If a householder wished to have his dwelling flushed out of its turn it was done at a nominal charge, according to the ratable value of the premises. Thus not only were the drains of a house flushed, but if defects in the main drains existed they were reported and remedied.

Addressing himself to the important question of sewage disposal, Mr. Boulnois said that great progress had been made under this head. Much, he thought, might be said for the septic system, under which decomposition was allowed to proceed in tanks under safe conditions, the effluent being passed through filters. In this way nature was followed and not arrested, as it usually was by most processes of chemical treatment. Under the septic system, decomposition, that great law of nature, was allowed to step in, and by breaking up the constituent parts of the sewage rendered the effluent the more amenable to nitrification.

THE BEST METHOD OF HANDLING APPLICATIONS AND PERMITS OF WATER COMPANIES.

In the series of articles published during the last year in MUNICIPAL ENGINEERING MAGAZINE upon the book-keeping systems generally in use by water-works companies throughout the country, one phase of the subject was but briefly noticed, viz., the manner in which the records of applications and permits are kept. How best to do this is by no means a simple matter to determine, as many compa-



nies have found. These records must be referred to a great many times, and they should be so arranged that it can be done without unnecessary labor. Then, too, new records are continually being introduced and old ones are being changed, so that the books in which they are kept sooner or later become worthless and have to be replaced. No method has ever been devised to meet the requirements of every case of this kind so fully as the card index system. Whether this system is the matured invention of an individual bright mind or the spontaneous and natural response to a "long felt want" it is needless to discuss. One thing, however, is certain: it is the logical solution of many a difficult problem, and it has come to stay. Originally devised as a flexible cross-index of names, titles and subjects in libraries, it has been until recently confined to that field. Water companies, so far as known, have never taken advantage of the method, but it is certain that there is here an opportunity for a great improvement.

The accompanying illustrations will give an idea of the workings of the system as devised by MUNICIPAL ENGINEERING MAGAZINE and applied to water companies. Instead of keeping the records of applications and connections in a book, each case is recorded on a card, which is filed away in alphabetical order and can be found in one-quarter of the time required to look up a book record. New applications, as fast as received, are inserted in their proper places. Alterations are entered upon cards of a different color and filed with original application. The forms printed upon the cards shown in the illustration are ample for the needs of most companies, but if larger ones are needed larger cards should be used.

The method of procedure is as

No.	Street	Reg. No.	App. No.	Ent. Reg. Pg.
Name		Owner		

I hereby apply for a supply of water through a _____ attachment for above premises. I agree that said water shall be used for the following purposes only, and in conformity with your rules and regulations, a copy of which I have read and understand. I agree to pay for such service at the following prices.

Should water be desired for any other purposes than herein set forth, I agree that prior to such uses I will make formal application for such privilege and pay the rate charged therefor. Should I ever desire a change in my service pipes for further water privileges or convenience, before any such changes are made I agree to first make formal application to your Superintendent and obtain his permission for same.

Date (sign here)

Approved:

Date By

Special remarks see other side.

File under Street and Number. MUNICIPAL ENGINEERING, INDIANAPOLIS. APPLICATION CARD.

FIG. 1. APPLICATION CARD (left half of double card).

Name		Reg. No.	App. No.	Ent. Reg. Pg.
No.	Street	Owner		

Above named applicant is hereby granted permission to employ _____ plumber, to _____ the following fixtures to the water company's mains for use upon premises described. _____

All work to be done in accordance with the company's rules and regulations, and subject to the approval of its superintendent.

Date (sign here)

INSPECTOR'S RETURN.—Upon inspection I find that all of the above connections have been made, AND NO MORE. I have carefully examined the work and find it to be done in accordance with the regulations of the company, except as hereinafter set out, and I find the plumber's diagram upon the back hereof to be correct.

Inspected 189 Water turned on

Size ; Make ; No. Meter

Inspector

Plumber will fill out diagram and description upon back and return to the water company promptly.

File under applicant's name. MUNICIPAL ENGINEERING, INDIANAPOLIS. CONNECTION CARD.

FIG. 2. PERMIT CARD (right half of double card).

follows: When an individual desires to connect a building with the company's mains, he fills out an application card, shown in figure 1, which card is retained by the company. Attached to this by a perforated line is a permit card

(figure 2), which is filled out, torn off and given to applicant. Connection having been made and the plumber's report received (figure 3, printed upon the back of card shown in figure 2), and the inspector's return received, the application card is filed away, with reference to the street and number, which for this purpose is given the prominent position. The permit card is filed in like manner in a separate receptacle with reference to the name of the applicant.

Special cabinets are made to hold these cards, the drawers being of suitable depth to permit the cards to be read when resting on edge, and without removing them from the drawer. Angle blocks are provided at the front and rear of the drawer so that the cards incline backward or forward, and when a card is being examined, it, with those back of it, is tilted back, while those in front are tilted forward. The cards are perforated at the bottom, as shown, and a rod is run through them and may be locked there if desired to prevent the removal or misplacing of the cards by unauthorized persons. The finding of cards when wanted is greatly facilitated by the use of the guide cards, which are shown in the illustration of the cabinet drawer. These are cards which have a projecting tab on the upper edge, and which by means of the letter or word thereon serve in-

The stop cock is located on the _____ Street

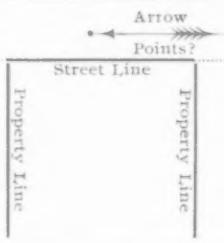
side of _____ street _____ feet

_____ (N., S., E. or W.) of _____

division property line and _____ feet

from street property line.

The following is a true statement of the connections made by me:



All fixtures are in good order. Water _____

Remarks:

Date _____ 18 _____

Plumber.

FIG. 3. PLUMBER'S RETURN (on back of Figs. 2 and 6).

Remarks:

FIG. 4. FORM UPON BACK OF FIGS. 1 AND 5.

No.	Street	Reg. No.	App. No.	Ent. Reg. Pg
Name		Owner		

I hereby apply for permit to make the following _____ in service connections and fixtures upon above premises.

When such permit shall have been executed, I will then be chargeable with water for the following purposes, which I agree to use for those purposes only and in conformity with your rules and regulations, and I agree to pay for such service at the following prices:

And I furthermore agree to abide by all the conditions of my original application now on file with your company, which application is hereby made a part of this agreement.

Date (sign here)

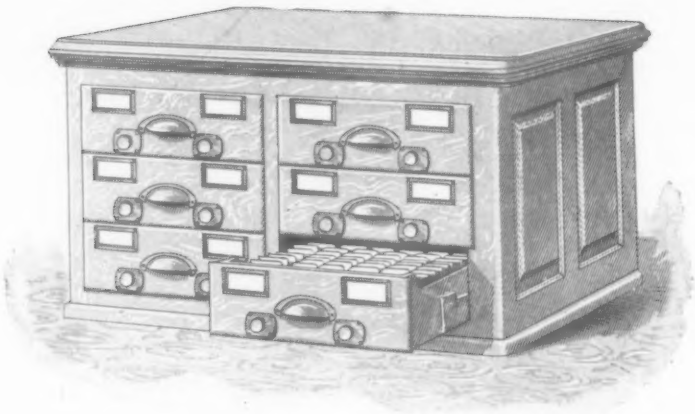
Approved:

Date By

Special remarks see other side.
File under Street and Number
With original application.

MUNICIPAL ENGINEERING, INDIANAPOLIS. **APPLICATION FOR CHANGE.**

FIG. 5. APPLICATION FOR ALTERATION (left half of double card).



stantly to tell where the card wanted may be found. The guide cards used in separating the groups of applications should show the names of the streets, the streets being arranged in alphabetical order, or in any other convenient manner. The guide cards used with the permits should show alphabetical divisions. The system is capable of unlimited expansion, without in the least impairing its efficiency. New names may be added daily and preserve the self-indexing feature of the system intact. There is no opportunity for the accumulation of dead matter, as all such matter is removed as fast as it becomes obsolete, and may, if desired, be filed in a separate case to itself. In this respect alone the card system, by doing away with the chief objection to the ordinary indexing methods, demonstrates its usefulness above any former method. It also lends itself to a great variety of other

Name	Reg. No.	App. No.	Ent. Reg. Pg.
No. Street	Owner		

PLUMBER'S PERMIT. (Alteration.) Above applicant is granted permission to employ _____ plumber, to make the following _____ in the connections and fixtures upon the above property.

All work to be done in accordance with the company's regulations and subject to the approval of its superintendent.

Date _____ (sign here)

INSPECTOR'S RETURN. Upon inspection I find the above _____ have been made, and no more; I have carefully examined the work and find it to be done in accordance with the regulations of the company, except as hereinafter set out, and I find the plumber's diagram upon the back hereof to be correct.

Inspected 189 Water turned on 189

Inspector.

Plumber will fill out diagram and description upon back and return to the water company promptly.

File under applicant's name.

With original.

MUNICIPAL ENGINEERING, INDIANAPOLIS.

ALTERATION CARD.

FIG. 6. PERMIT TO MAKE ALTERATION (right half of double card).

purposes which it is unnecessary to enumerate here, but which will suggest themselves to the user.

This method of handling applications and permits by water companies is a feature of the American Water-Works Standard Book-keeping System, developed by and under the control of Municipal Engineering Co.

Flat Rate | Meter | Special

No.	Street	Reg. No.	App. No.	Ent. Reg. Pg.

Name | Owner

I hereby apply for a supply of water through a_____attachment for above premises. I agree that said water shall be used for the following purposes only, and in conformity with your rules and regulations, a copy of which I have read and understand. I agree to pay for such service at the following prices.

Should water be desired for any other purposes than herein set forth, I agree that prior to such uses I will make formal application for such privilege and pay the rate charged therefor. Should I ever desire a change in my service pipes for further water privileges or convenience, before any such changes are made I agree to first make formal application to your Superintendent and obtain his permission for same.

Date (sign here)

Approved:

Date By

Special remarks see other side.

File under Street and Number. MUNICIPAL ENGINEERING, INDIANAPOLIS. APPLICATION CARD.

FIG. 7. APPLICATION CARD WITH TAB (left half of double card).

THE PORTLAND CEMENT INDUSTRY IN THE UNITED STATES.*

By Spencer B. Newberry.

The product of Portland cement in the United States during the year 1896 amounted to 1,543,023 barrels, as compared with 990,324 barrels in 1895, an increase of 552,699 barrels, or nearly 56 per cent. It is probable, however, that the output for 1895 was somewhat underestimated, owing to the difficulty of securing reports of production from some of the most important factories. In order to obtain complete and accurate returns for the year 1896, the writer visited personally the chief centers of production soon after the close of the year, and obtained returns which are much more reliable than those of former years. This extraordinary increase is shown in all the chief producing districts, but is most marked in the region embracing Lehigh county, Pennsylvania, and Phillipsburg, New Jersey. The factories in that section have been greatly enlarged during the past two years, and several of them now show a production but little infe-

*Extract from the Eighteenth Annual Report of the United States Geological Survey for 1896-7.

rior to the leading factories of Germany and England. The cause of this rapid growth is probably to be found in the unlimited supply of natural cement material found at that locality. This is a limestone containing such an amount of clay as to be approximately a natural Portland cement mixture. The different strata are selected and ground together in such proportions as to give a material of correct chemical composition. Another advantage which the Lehigh county cement rock presents is its comparative freedom from magnesia.

The following table shows the product of Portland cement in the United States during the years 1895 and 1896, by states:

Product of Portland Cement in the United States in 1895 and 1896.

State.	1895.			1896.		
	Number of works.	Product.	Value, not including packages.	Number of works.	Product.	Value, not including packages.
		Barrels.			*Barrels.*	
California	1	16,288	$32,566	1	9,000	$18,000
South Dakota	1	6,497	12,994	1	24,000	48,000
Illinois	1	750	1,325	1	3,000	5,250
Indiana	.....	.....	.....	1	9,000	15,750
Michigan	.....	.....	.....	1	4,000	7,000
New York	4	159,320	278,810	7	260,787	443,175
New Jersey	2	155,000	232,500	2	247,100	370,650
Ohio	4	186,698	289,221	4	158,082	267,892
Pennsylvania	7	504,276	756,414	7	825,054	1,224,294
Texas	1	30,000	30,000	1	8,000	24,000
Utah	1	1,500	3,000	...	.....	.....
Total	22	990,324	$1,596,830	26	1,543,023	$2,424,011

The relative development of the Portland cement industry in different sections of the United States presents some interesting features. The following table shows the number and production of the factories located in the chief producing regions in 1890, 1894, and 1896; also the relative percentage of the total American product which each section contributed:

Number of Works and Relative Product of Portland Cement at Various Localities in the United States During the Years 1890, 1894, and 1896.

	1890.			1894.			1896.		
	Number of works.	Product.	Per Cent.	Number of works.	Product.	Per Cent.	Number of works.	Product.	Per Cent.
		Barrels.			*Barrels.*			*Barrels.*	
New York	4	65,000	19.4	4	117,275	14.7	7	260,787	16 9
Lehigh County, Pa., and Phillipsburg, N. J.	5	201,000	60.0	7	485,329	61.2	8	1,048,154	68.1
Ohio	2	22,000	6.5	4	80,653	10.1	4	153,082	9.9
All other sections	5	47,500	14.1	9	115,500	14 0	7	81,000	5.1
Total	16	335,500	100.0	24	798,757	100 0	26	1,543,023	100.0

The above table shows that the Pennsylvania region, including Lehigh and Northampton counties, and the neighborhood of Phillipsburg, New Jersey, has for many years produced much more than half the Portland cement manufactured in the United States, and also that the industry is increasing in that section more rapidly than elsewhere. New York and Ohio show a steady and considerable growth, while the production in other parts of the country, taken collectively, shows a marked decline in number of works and total

product during the past two years, and but little gain over the figures of seven years ago. It may, in fact, be stated that the Portland cement industry has never yet found a secure footing in any sections of the country except the three above mentioned. This may appear remarkable, in view of the immense consumption of Portland cement in Chicago, St. Louis, and all other cities in the central and northern portion of the country. The explanation is probably to be found in the occurrence of abundant and suitable materials in Pennsylvania, New York and Ohio, and also in the superior shipping facilities which these sections afford. Small factories are in operation in Illinois, Indiana, Michigan, California, South Dakota and Texas, but these show little or no growth and find only a local market for their product. Suitable materials for Portland cement are, however, found abundantly in these and other states, and the development of the industry on a large scale in various parts of the country may be confidently expected within the next few years.

The imports of Portland cement in 1896 were 2,989,597 barrels, a slight decrease from those of the preceding year. The amount of cement imported for the past six years has been remarkably uniform, the total of 1896 being almost exactly equal to that of 1891. The following table shows the imports by countries, in 1895 and 1896:

Imports of Cement into the United States in 1895 and 1896, by Countries.

COUNTRY.	1895.	1896.
	Barrels.	*Barrels.*
United Kingdom	806,884	742,169
Belgium	708,875	742,287
France	22,887	26,714
Germany	1,299,919	1,366,909
Other Europe	141,909	99,184
British North America,	10,416	11,334
Other countries	6,555	1,050
Total	2,997,395	2,989,597

The above table shows the continued increase in importation of cement from Germany and the decrease in the imports from Great Britain. During the past twenty years German cement has grown rapidly in favor in comparison with the English. This is due to the more careful methods employed in German factories, which have resulted in a steady advance in quality, uniformity, and fineness of grinding. The English manufacturers, on the other hand, have clung persistently to the old methods of manufacture, and have only within the past two or three years made any effort to keep up with modern requirements. In the meantime the largest share of the American trade has been secured by the Germans.

FILTRATION OF SEWAGE THROUGH COAL.

Prof. A. Bostwick Hill, in a paper read before the British Association of Municipal and County Engineers, reported the results of filtration of sewage through coal at Litchfield. After twelve months it appeared that the efficacy of the coal had increased. At first it appeared that the action, which, unlike that of many other mechanical filters, was considerable, was a chemical one by the coal, because the oxygen absorbed was at once directly affected. Afterwards, however, nitrates were produced in considerable quantity, so that prob-

ably there was then a double action —chemical and bacteriological.

The author concluded his paper as follows: "The coal appears to have a special power of removing the putrescent organic matter from the sewage. The effluent is particularly bright, and shows a marked diminution in the quantity of oxygen absorbed. It is also perfectly free from odor, and thus gives evidence that the organic matter removed is that portion particularly which is in a state of putrescence. If this were not so we should expect to find an equal degree of purification shown by the quantity of organic ammonia present; but, as a matter of fact, the purification in this way always appears less than by the amount of oxygen absorbed. On examining the interior of the filter, after a constant use of many months, it has been found to be quite free from odor and to have nothing but a slight earthy smell. How much longer than twelve months the medium will still be effective is not at present known, but there is reason to believe that its period of usefulness will be considerable, and when it ceases to be effective as a purifier it is at a very small cost replaced by fresh coal, while that from the filter is not wasted, but can be used for purposes of fuel. It would appear, therefore, that in many places where land of a suitable character can not be obtained, that in coal we have a medium, cheap and effective, which will produce an affluent as good or better than that which may be obtained from land, while in those districts which have hitherto relied on land purification it would appear also that by the putting down of coal filters greater purification can be obtained; and in a growing community it seems possible by this method of treatment to do away with that constant increase in the area of land required, which is such an incubus on the rates of our urban communities. A coal filter, like any other filter, or like land, must be used with a due regard to scientific possibilities.

"In my experience in all parts of the country I have been struck particularly by the fact that one of the most common causes of failure of the means taken for sewage disposal is the tendency of authorities to cut down the cost of carrying out such treatment. Such experiments have only one end; purification gradually gets less and less until it ceases, and a very much larger expenditure of money is required to rehabilitate the means of purification. Of course it is understood that in dealing with sewage by filters a preliminary precipitation of suspended matter has taken place, and the better this preliminary purification has been effected, the better the result obtained in the effluent from the filter. In the working of local filters up to the present it has been found best to allow the filter to work for a period of twelve hours and then to give it a similar period of rest. As in all other filters, this rest is absolutely essential, but I have reason to hope that the period of rest may be shortened without any detriment to the efficiency of working of the filter. I submit, therefore, that in coal we have a filtering medium which produces a result far better than that claimed for other media. It is superior to coke breeze or ballast in that it has *at once* a chemical action, and its purifying power is marked from the first day it is used, although a still better result is obtained after a period of two or three months' use. The medium is cheap and easily obtained, and although

in the past I have looked upon filtration of sewage otherwise than through land as of partial and limited value, I strongly believe that the death knell of the costly sewage farm has been rung, and, what is of far more importance from an economic and sanitary sense, the problem of sewage disposal has been at last solved, and the prevention of pollution of our rivers and streams has become not only possible but practicable."

THE QUESTION DEPARTMENT.

[By Charles Carroll Brown, M. Am. Soc. C. E., for MUNICIPAL ENGINEERING.]

LAYING WATER PIPE ACROSS A RIVER.

We wish to lay a 6-inch water pipe across the Big Sandy river, a distance of 375 feet, and to rest it on a bed of hard-pan underneath the softer material forming the bottom, but are unable to do so on account of rise of water in the river and must postpone the permanent construction until next fall. Meantime, for temporary use, would the following construction be safe? We propose to use extra heavy screw joint pipe and lay it under the river bottom, about three feet if possible, and at each end to put in a vertical pipe to a point about nine feet up, which would be above the ordinary level of the water. The pipe would here return to the horizontal and run into the bank and thence on in the regular way. The vertical pieces would not be strictly vertical, but would slope down on the up stream side, so that if the bottom scoured out any the pipe could swing down and remain on the bottom. *Seymour Bros. & Co., New York.*

This construction has been used where there is little danger from floods for such temporary or semi-permanent purposes and might be safe in this case, but the sudden rises in the river and the flood wood which is carried by them may cause trouble. If the bed of the river is very liable to wash the pipe may be carried away; on this account also any temporary construction must take these chances. It would seem to be advisable to carry on the work of laying the pipe in the manner proposed for the permanent construction, as far as possible, so that when the stage of water will permit, the work can be taken up and completed with as little extra expense as possible. There are methods which can be applied thus, some of which may be applicable in this case. Advice by a competent engineer who has inspected and carefully studied the conditions would be likely to save the company much more than it would cost. The case is one which needs personal attention.

WATER CONSUMED PER HOUR BY AN ENGINE.

A milling company uses water from the system of which I have charge for a 55-horse power engine, carrying an average of 65 pounds of steam. How can I arrive at a fair estimate of the amount of water consumed by this engine per hour?

E. S. Warren, Maxwell City, N. M.

At the rate of consumption of water for steam generally assumed for an engine, 30 pounds per horse power per hour, this engine would use 1,650 pounds of water an hour or 198 gallons. Thurston's rule for the amount of water used to form steam for the engine is the constant 200, divided by the square root of the pressure, equals the amount of water used. In very good engines the constant may be reduced to 150. Assuming 200 to allow for leakage, etc., we have $\frac{200}{\sqrt{65}}$ which is practically 25 pounds per horse power. This amounts to 165 gallons an hour for the 55 horse power engine. Making al-

lowances for water used legitimately about the boilers and engine and for a reasonable amount of leakage, so long as the engine is not run beyond its rated capacity 165 gallons an hour may be assumed, but if there is a tendency to waste water and to crowd the engine 198 gallons an hour should be taken.

[By J. W. Howard, B. L., C. E., for MUNICIPAL ENGINEERING.]

THE CROWN OR TRANSVERSE CURVE OF AN ASPHALT PAVEMENT—HOW FORMED.

In laying sheet asphalt pavements for roadways, can a profile or sectional form of wood or metal, reaching from curb to curb or curb to rail, be used above the hot material to advantage to secure a uniform sectional profile?

Henry N. Francis, Providence, R. I.

In practice it has not been found practicable to use a templet, form or pattern, with which to shape or "strike off" the hot asphalt paving mixture to produce the curve or form of the crown or transverse shape of a roadway under construction. The asphalt paving mixture, being hot and sticky, becomes attached to the templet, preventing its further use until cleaned. This occurs every few moments, whether the templet be of wood or metal. The templet can not be kept hot. It injures the pavement to oil the templet. Moreover, the curb or border stones are too irregular to act as a guide.

The proper procedure is to have the concrete or other foundation finished to a surface parallel to the final asphalt surface desired. Next, by means of a line well chalked, imprint a white impression on the curb at a height to which the hot asphalt paving mixture must be raked, allowing for compression. The rakes used should be specially prepared with teeth of exactly the right length—long enough to allow for compression of the mixture. Only trained and experienced men should be permitted to handle the rakes. New men are first trained on repairs, and next by sandwiching them between experts. The foreman must have experience and be able to judge with his eye whether or not the work is being done evenly. One or two long "straight edges" should be always at hand with which to test the longitudinal surface of the finished pavement during its progress.

There is a device which it is an advantage to use on streets which are very wide, or at the center of narrow ones. It consists in a rod a little more than one-half inch in diameter and from ten to fifteen feet long, which is supported by small adjustable pieces of metal, by means of which the rod can be set at any desired height. This rod or "raking-gauge" is placed lengthwise the streets and the asphalt paving mixture raked to the level of the rod, which is then removed and placed in position to again serve as a gauge. It is, of course, usually placed parallel to the sides of the street.

The handling of asphalt paving mixtures must be done rapidly and surely, because of the presence of heat which must not be lost before the work is finished. This is another reason which prevents the use of templets or forms, such as are permissible with work accomplished with Portland cement on sidewalks and floors.

THE NEW CORNER SIGN LAMPS OF NEW YORK CITY.

What are the lamps lately introduced in New York City for showing the street names? How do they show the numbers of the houses? *E. W., Worcester, Mass.*

These lamps are not for the pur-

pose of lighting a street, but of giving the names of the intersecting streets and the number of the nearest house on each street. They are so important an improvement that every large city should use them, or their equivalent, for the benefit of the public. This magazine has had a careful drawing made of one, as shown. The signs can be read not

only at night, but in the day time; not only by foot passengers, but also from vehicles. The presence of the house numbers on the lamps removes a feeling of doubt from thousands of minds every night, on the part of persons seeking special residences, etc. Ground or clouded white glass is used, which facilitates reading the letters. These posts are the old ones which were left standing throughout the city when electricity, upon other and taller poles, displaced the use of gas. By adding the handsome top, with the signs and numbers, a former eye-sore has become a thing of beauty and of practical advantage to the city. The amount of gas consumed is very small, because it is not necessary to have more than a "one-foot burner" within, whereas if they were for lighting purposes a "six-foot burner" would be used.

RELATIVE ECONOMY OF HORSE, CABLE AND ELECTRIC STREET-CAR TRACTION.

Please state the relative cost per mile or otherwise of horses, cable or overhead trolley electricity for propelling street-cars? *A. B. Spencer, Chicago.*

This is not possible from your question nor the information given in the rest of your letter. If the traffic is very light and the cars at very long intervals apart, horses are still the most economical. As the frequency of the cars is increased to less than about ten minutes apart, the trolley becomes more and more economical than horses, especially when measured by the number of passengers carried and at a greater speed than with horses. The cable is out of the question except upon streets where a large number of cars is in constant use, carrying thousands of passengers per day.

The cost of establishment or construction enters into the comparison by means of the interests upon the outlay. All things considered, the following table may be regarded as exhibiting the relative cost per car per mile upon any main thoroughfare of a city larger than 400,000 inhabitants, the cost of coal, labor, etc., being regarded as the same in each place:

Horses	18.4	cents per car mile.
Cable	12.7	" " " "
Electricity	10.5	" " " "

For many reasons these costs do not represent exact figures for any one place, nor relative figures for all places. Each street railway line is a special problem and should be so regarded and solved.

AGITATION OF ASPHALT CEMENT BY AIR OR MECHANICAL STIRRING.

Which is to be preferred, the stirring and agitation of asphaltic cement by means of air blown into it, or with a mechanical stirring apparatus?

A. C., Chicago.

In compounding refined asphalt and the flux which is added to it, either in the form of standardized residuum oil of petroleum or some special maltha, it is necessary while heating and at intervals during the use of the resulting asphaltic cement to stir or agitate the mixture. This is the more necessary because commercially refined asphalts contain more or less fine silica or other suspended mineral matter, which must not be allowed to settle. A blast of air through a movable tube is the system most in vogue and gives satisfactory results. It is cheaper and more easily manipulated than any revolving device or arms of metal on a turning shaft. It seems best that warm air should be used, although it is not absolutely essential.

The question as to whether or not the air oxidizes or injures the asphaltic cement is still an open question in the minds of a few, but for practical paving purposes the very slight injury done, if any, is hardly worth consideration.

ASPHALT BLOCK PAVEMENT.

How long since the first block asphalt street was laid? Are the results satisfactory? If not, in what particulars? In what cities has block asphalt been used?

C. A. Ewing, Cincinnati, O.

It is not possible to state definitely when the first block asphalt pavements were laid, because cubical blocks or blocks of various shapes have been manufactured for more than a generation depending upon asphaltum as a binding material of the sand, crushed stone, powdered limestone, or other ingredients in them, both in Europe and America. For a reasonable degree of traffic certain kinds of artificial blocks called asphalt blocks have often seemed satisfactory, although there have been some unfortunate failures in the past of this system of paving.

For further and full information concerning this subject, it is best for you to communicate with one or more of the companies manufacturing asphalt blocks of various kinds and sizes for streets, walks, etc. The address of several will be found in our advertising pages, although, in fairness, we must state that there are a few other companies in the United States, England and France.

BY WAY OF COMMENT.

Cincinnati Pumping Engines.

The general specifications for the new pumping engines at Cincinnati, bids for which were opened November 30, called for three self-contained vertical triple-expansion crank and fly-wheel pumping engines, each of 30,000,000 gallons capacity in twenty-four hours, and capable of a duty of 115,000,000 foot-pounds per 100 pounds of Pittsburg slack and nut coal, together with boilers and all necessary appurtenances. A fourth engine of the

same capacity with boilers may be added to the contract if the water commissioners desire. The specifications are quite complete and are well worked out. An interesting provision is the following: After stating the conditions of the test of the engines, the specifications say, "For a shortage in quantity of water pumped in the 144 hours (period of test), $1,000 (shall be deducted) for each million gallons each engine falls short of the 180,000,000 gallons specified; for a shortage in duty, at the rate of $2,000 for each million foot-pounds each engine falls short of the 115,000,000 duty specified during the test. In case any engine during the test exceeds the required duty of 115,000,000 foot-pounds, the contractor shall receive an additional sum over and above the contract price at the rate of $1,000 for each 1,000,000 foot-pounds which the duty developed during the test exceeds the specified duty."

These provisions are similar to those specified for the high-pressure engines of the new St. Louis waterworks, the contract for which was let in 1894.

In Cincinnati the head is less, as it will not be more than about 165 feet, while it is nearly 300 feet for the St. Louis engines; the duty is 10,000,000 foot-pounds less, and the capacity of each engine is three times that of one of the St. Louis engines. The forfeit for failure to reach the specified duty was $2,500 in St. Louis. This method of writing the specifications produced a peculiar effect upon the bids at St. Louis. The successful bidder procured the contract at a price $23,000 below the next lowest bidder, a difference of nearly 20 per cent. They expected, however, to receive about $30,000 bonus for exceeding the duty specification. Other bidders did not feel so sure of their ability to do this and kept their figures up as a consequence. The specification offers an additional inducement to engine builders to put forth every effort to fulfill their promises as regards duty, and success finds its reward. A similar specification would be valuable in any case.

A statement of the basis for the amount of the forfeit, $2,000, would give valuable information. The capitalized value of the added cost of pumping would seem to be the true basis. In this case, the loss of coal due to a reduction in duty of 1,000,000 foot-pounds would be nearly 300 pounds a day, with the given capacity and maximum lift. If the coal costs about $1.50 a ton, it would be capitalized at about $2,000 at 4 per cent. If the coal costs more, or the capitalization is at a less rate of interest, $2,000 is not a sufficient forfeit.

An appurtenance first used in the new St. Louis works is called for here, namely, an electric crane of sufficient capacity to handle any part of the engines. This must be of very great value in building, and in overhauling the engines.

Methods of Filtration. The slow sand filtration of water seems to be the popular system at the present time, but there are some advocates of the mechanical systems in certain cases. Rock Island, Ill., has had a small gravity mechanical filter in operation for some years, in which no alum has been used recently. Auxiliary pumps were necessary to lift the water to the filter. Instead of increasing this plant or replacing it with pressure filters of sufficient capacity, the city has purchased ground above the level of a gravity distributing reservoir for settling basins and slow sand filtration beds. The water commissioner of St. Louis has been experimenting with mechanical filters for the Mississippi river water, and has just returned from a tour of inspection of European filtration plants. Cincinnati will repeat the experiments made at Louisville, the results of which are not yet ready for publication, and will compare mechanical and natural filtration. The Providence experiments show very satisfactory results from mechanical filtration. So much work on different river waters should give us definite results in a comparatively short time.

Duluth Water Works. The city of Duluth, Minn., has been trying for several years to purchase the water and light plant of the Duluth Gas and Water Company, and has voted several times in favor of the proposition for construction of supplementary works and for issuing bonds. Some citizens, especially the present mayor, have fought the payment to the company of the sums voted, believing them to be too large, and have defeated the project each time, by taking advantage of some legal misstep in the proceedings. Each defeat has brought about a reduction in the price named by the company, and the price now agreed upon by the officials of the city and the company is $1,250,000, a sum but little larger than the estimate by the city's engineers of the value of the plant, and but little more than half the estimate made by the company and its engineers. The people will have an opportunity, Jan. 12, 1898, to vote on the proposition to pay the company this sum. The message of the mayor to the council is very interesting and instructive and the city is to be congratulated on the favorable condition of the negotiations.

The Sewage Sludge Problem. At present it costs the London County Council nearly $150,000 a year to carry out to sea the 2,000,000 tons of sludge which are produced at the sewage precipitation works, six vessels being maintained and the distance the sludge is carried before dumping being fifty miles. A new process is now proposed and machinery is now under construction which will dry the sludge and press it into blocks which can be used as fuel. An experiment on a small scale is said to have warranted the construction of machinery to take care of a large proportion of the

sludge now produced. If the sludge has 90 per cent. of moisture there will be 200,000 tons of fuel produced in a year. This may be increased two or three times its bulk when the sludge has less moisture in it. The reports are rather rose-colored and include a proposition to reclaim the lime and iron used in precipitating the sludge. Without doubt the sludge can be so dried, but the question will be as to the economy of the operation and the value of the fuel. Under good conditions it would require about 180,000 short tons of coal to evaporate the 1,800,000 tons of water. If the sludge has less moisture, and the sludge has even less than half the fuel value of coal, the amount of fuel produced from the sludge would be nearly or quite sufficient to evaporate the sludge. Probably the sludge has an evaporation efficiency which is only a small percentage of that of good coal, so that this surprising result would not be claimed by the promoters of the project, but any approximation to it would be a valuable discovery. The process would be most economical in works having enough sludge to keep a large machine busy. Further reports will be awaited with interest.

Ashland Filtration. The Ashland Water Company, of Ashland, Wis., has adopted slow sand filtration for its supply, which is drawn from Chequamegon bay, where it is subject to some pollution from the sewage of the city. The company was forced to put in the plant by the complaints of the people and the authorities, and by the prohibitive cost of a line of pipe from the open lake. Much of the trouble from sewage has been caused by the construction of a breakwater for the harbor, and of a dike to cut off one of the entrances to the bay. Mrs. Julia Green has recently secured a verdict of $5,000 damages from a Wisconsin court against the water company for the death of her husband from typhoid fever, the jury finding that Mr. Green died of fever contracted from water furnishd by the company from the bay when it knew it was not furnishing pure water, and was able to do so. This is not the first suit of this nature that has been brought, the town of Richfield Springs, N. Y., having been sued for damages in a case of typhoid fever attributed to defective drainage. It is, however, the first one of importance in which a verdict in favor of the plaintiff has been given.

The company did not await the issue of the suit, but during 1895, constructed three filter-beds of a combined area of one-half acre, which are covered with arched roofs of brick masonry supported on brick piers about 16 feet apart. The filter-beds are constructed in the bay adjoining the pumping station, the top of the layers of sand being about 3.5 feet below the surface of the water in the bay. The supply comes through an intake pipe from a point about 5,000 feet from shore

into an intake well, runs thence to the filter-beds, and thence to the pump-well, by gravity, whence it is distributed, by direct pumping, through the city. The amount filtered during the first year averaged 2,180,064 gallons a day. The actual cost of maintenance for the first year of operation was $899.37. The cost per million gallons filtered was $2.26, not including interest on the plant. The first cost of the filters was $40,178. If the interest charge on the whole plant is added, the total cost of filtration would be three to four times the figure given ($2.26). The results, as indicated by the bacteriological analysis, are not entirely satisfactory, but this may be largely because proper care and improved methods have not been used.

Sewer Assessments. There is much complaint in the city of Cleveland, O., regarding the manner of making sewer assessments. The city is divided into sewer districts, each comprising as nearly as possible the territory drained by one or more main sewers and its branches. When a sewer is built, the cost up to $2 a front foot, of the property abutting on the line of the sewer, is assessed upon this property. The excess of cost over $2 is assessed upon the sewer district as a whole. An annual levy upon the property of the district amounting to $3 on each $1,000 of valuation may be made to meet these assessments. This system makes the abutting property pay for most of the length of the sewers, and in some districts the amount of excess over $2 a front foot to be assessed upon the district is quite small, while in others, where the main sewers are long and large, it is excessive. In general, a very large proportion of the actual length of the sewers is paid for in proportion to the frontage on the street, without reference to area or to valuation. The small remainder in most districts is assessed according to valuation. In some districts this remainder is large enough to be quite burdensome. In no case is there any consideration of the relative amount of use of the sewers by various property owners. The differences in assessments in different districts also show great inequalities.

It is proposed by one city official to replace the present system by one which will imitate as closely as possible the present method of collecting water rents, requiring all persons connecting with the sewer to pay a sewer tax annually in proportion to the use made of them, just as water is paid for in proportion, approximately, to the amount used. By this method of assessment all unoccupied property, and property using little or no water, would be practically exempt from taxation for sewer purposes, notwithstanding the advantages to the property of having the streets well drained and the surface water carried off promptly, and the enhancement of value on account of ability to make sewer connections when desired.

The objectionable features in both cases, and in other actual cases, arise from incomplete consideration of the questions which arise, and the formulation of laws regulating assessments upon one or two of the governing principles only.

If the sewers are for house drainage only there may be some reason for assessing the cost of construction and maintenance according to the use made of the sewers by the adjoining property, but this is not entirely equitable. As in the case of water pipes there is an enhancement in the value of property by the simple proximity of the sewer which is proportional both to the valuation and the frontage of the lot, if not to the area, and the property should have an assessment of a portion of the cost on this account. If the sewer drains only the houses on its line it is of little value to any one else and almost its cost may be assessed upon the abutting property. A small amount may be charged to the city at large on the ground of general benefit. A laundry in a cheap building on a narrow lot may use much water and make great use of the sewer, while a large warehouse of great value adjoining may make almost no use of it. An assessment according to amount of use may thus seem to be equitable. Similar arguments may be made in special cases to show the justice of making the assessment by frontage, by area of lot and by valuation. The fact is that all these items should come into the consideration and each case be settled on its own merits. This being impossible, and assessment by rules fixed by law being necessary, we must expect to find isolated cases of injustice under any system. In case of a sewer which drains not only the houses along its route, but receives the discharge from other sewers also, it is evident that the portion of the cost due to this extra work should be assessed on the property actually benefited. This may be done by estimating a local assessment equal to the cost of a sewer to drain the one street, to be assessed on the abutting property, the remainder to be assessed upon the whole area benefited. If there are great differences in the cost of such main sewers in different districts, they may be considered to be unavoidable on account of the natural differences in conditions, but the heavy burden on some districts may be lightened by assessing the amount above a certain price per foot on the city at large, and the city thus be induced to pay some of the amount which is really due from it. The furnishing of sewers is not a continuous operation like the furnishing of water, nor is it so strictly individual.

The cleaning and ordinary repairs of sewers and their appliances are general charges upon the entire system and should be paid for out of the city treasury. An annual rental is therefore not a proper basis for assessments. The principal and interest of bonds may be

met by annual payments, but they are of the nature of deferred payments and cease in a few years.

If the storm water is admitted into the sewers, additional arguments appear for assessments upon the frontage, area and valuation of the property, and the proportion to be assessed on account of actual individual use of connections with the sewers may be reduced so low as to be inappreciable. The arguments for considerable assessments upon the city treasury are strengthened also.

When outlet sewers and intercepters are considered, their construction by the city at large is generally shown to be the most logical conclusion.

Local conditions vary so much that no proportions can be assumed which will be applicable to all cases. Neither is it possible to foresee all the special cases and devise a system of assessment which shall be equitable in every case in a single city. More thorough study and more careful consideration of all the details will make it possible to devise more equitable rules than any now in use. An attempt will be made in a future number of MUNICIPAL ENGINEERING to devise such a scheme for a definite case where the conditions are well known.

Efficiency in Municipal Affairs.

D. W. H. Moreland is making a highly creditable record as a commissioner of public works in Detroit. His careful study of municipal questions since he became a member of the board has often come to the attention of the editors of this magazine, and it is gratifying to note that he is courageously performing his official duties with more regard for efficient service to the public than for party policy, though, in an intelligent community, honest and efficient service is nearly always the best course to pursue to insure party tenure. It seems that in Detroit, however, some of the practical politicians are displeased with Mr. Moreland, because party workers do not receive desired consideration from him, but he can well afford to ignore their complaints. He evidently well understands this and is determined to give the city successful administration of his department. If the people of Detroit fail to show proper appreciation of this kind of service it will be a reflection upon them.

CURRENT INFORMATION.

THREATENED FORFEITURE OF AN ASPHALT LEASE IN UTAH.

The American Asphalt Company has been called upon by United States Secretary of the Interior Bliss to show cause why its lease in the Uintah reservation should not be forfeited. The lease was secured from the Indians by William A. Perry and James T. McConnell, Feb. 17, 1893, and it involves 5,000 acres of the Uintah reservation, containing gilsonite in three different tracts. These tracts were to have been selected on or before Dec. 1, 1893, and maps and plats were to have been filed with the Indian bureau by Jan. 1, 1894. The time was extended until Aug. 1, 1894, and the department now holds that the plats were not selected in time, and that no satisfactory explanation for the delay has been given, and that the conditions for approval have not been complied with. Information from Washington shows that nothing has apparently been done since Aug. 4, 1894, to acquire title to the 5,000 acres of gilsonite, which leads to the supposition that the promoters of the enterprise have abandoned it.

The company, however, has instituted suit against Cornelius N. Bliss, Secretary of the Interior, and William A. Jones, Commissioner of Indian Affairs, to enjoin them from declaring void a lease to certain mining lands on the Uintah Indian reservation, and from interfering in the necessary operations of the company on its property.

ROOF FOR A WATER RESERVOIR.

Mr. Dow R. Gwinn, superintendent of the Quincy (Ill.) water works, has awarded a contract for the construction of a roof over the reservoir of the works early in the spring. The roof will cover 127,000 square feet of surface. It will be supported by 462 piers of 6x6-inch timber, set on foundations of brick and stone. The roof will be from four to six feet above the water and will be supplied with a great number of trap doors. In winter these doors will be left open. They will serve the double purpose of permitting the snow to fall through into the water and form openings through which the snow that lodges on the roof may be shoveled into the reservoir.

The purpose in building the roof and other advantages which have made the Quincy water works famous, are explained in the following statement:

"It is not the purpose to exclude light from the water. There will be plenty of light. The intention is to exclude the direct rays of the sun and thus prevent the growth of algae and other vegetable matter. The principle is the same as that observed in nature, when no grass will grow under an umbrageous tree, although the ground is open to air and light. The absence of the sun's rays prevents vegetation. The boards of the roof will be laid north and south, and no sun rays will reach the water to remain for any length of time. It is only in filtered water, mountain streams and artesian water that vegetation develops when exposed to the sun. St. Louis has no trouble from algae for the simple reason that the water there is so muddy that it furnishes its own cloud, through which the sun cannot penetrate.

"Quincy's water supply is doing as much to advertise the city favorably throughout the country, and even across the ocean, as any agency we possess. We have had visitors from all parts of the world to inspect the filter plant and settling basin, and invariably their verdict is that of Mr. Simin of Moscow, Russia, who said that it was the most satisfactory he had ever seen.

"The settling basin attracts nearly as much attention as does the filter plant. It is eighty feet square and ten feet deep. The walls are six feet thick at the bottom and three feet thick at the top, built of solid masonry laid in Portland cement, the bottom being of solid concrete. The basin has a capacity of 300,000 gallons. The water is pumped into it direct from the river. At the top of the west wall is a steel trough two feet wide by six inches deep. The trough skims the clear water which rises in the basin and empties it in an effluent well sunk in one corner of the basin, which is thus kept full of the surface or purest water. From this well the water is conducted to the filtering tubs, and from there is pumped to the storage reservoir. The building of this basin added 50 per cent. to the daily filtering capacity of the works. Six million gallons of river water may be now made as clear as crystal every twenty-four hours the year around."

BALTIMORE'S STREET IMPROVEMENT COMMISSION.

A commission, consisting of the mayor, the presidents of both branches of the city council, and two members from each branch, will be appointed, at Baltimore, Md., to inquire into a general plan of street improvements, the manner of paying for the same, and other facts pertinent to the subject. The ordinance providing for the appointment of the commission was signed Dec. 7 by Mayor Walster.

DISPOSITION OF STREET SWEEPINGS.

In his current annual report Secretary of Agriculture Wilson touches upon the fact that the division of chemistry of his department has already made some investigations into the subject of the disposal of street sweepings, and intends to do a large amount of work in this direction during the coming year. Communication has been established with every city in the United States of a population of 10,000 and over and arrangements have been made to obtain information from the largest cities in Europe in regard to the disposition of sweepings and sewage. This work has a double value, a

hygienic and economic value, and it is important from a manurial point of view in regard to the use these materials may be put to for fertilizing purposes.

DAMAGES FOR POLLUTION OF A STREAM.

A decision has been rendered in the Superior Court of Hartford county, Connecticut, bearing on the question of sewage running into streams. J. M. Belden of West Hartford, owning a farm on Piper's brook, brought suit against the city of New Britain for damages, claiming injury to his farm from pollution of the water, which his cows would not drink. The sewage from New Britain runs into Piper's brook, which in turn delivers the sewage into Park river, which runs through Hartford. Judge Prentice gave judgment in favor of the plaintiff, with $1,700 damages and costs.

ASPHALT BLOCK PAVEMENT IN LONDON.

A recent issue of the Pall Mall Gazette reports that London officials are experimenting with asphalt blocks. The Gazette says:

"For more than a week now workmen have been hard at it, tearing up the old and laying down the new in various quarters of the metropolis, and by this time next year the chances are that Londoners will know whether at last the perfect paving block has been discovered, or whether it has not. Her Majesty's office of works has given permission to lay down the new blocks at three entrances to Hyde park—namely, the Marble arch, Hyde park corner, and at Knightsbridge; various vestries have also agreed to try the blocks, and in a few weeks' time a large space in some one of the city's principal thoroughfares—which street and what part of it has not yet been decided—will be covered with the bitumen that comes from Trinidad lake and the ironstone that comes from the United States. That a thoroughly satisfactory trial of the new order of things may be assured, a Baltimore foreman skilled in the art of laying the blocks has crossed the Atlantic to superintend the work. Some months ago this same foreman spent some time in Paris laying down trial patches in busy boulevards, which trial patches are said to have proved highly satisfactory. These trials, together with the reputation the blocks have now in America, induced the board of works to allow such important spots as the Marble arch and Hyde park corner to be used as ground for experiment. The blocks are made of Trinidad lake bitumen and hard stone broken into small pieces. The bitumen and splintered stone are mixed and put under tremendous pressure, during which the blocks are given shape. They come out of the press fit for immediate use, and, piled up by the wayside, do not look at all unlike blocks of wood."

Mr. C. G. Palmer, president of the Hastings Pavement company, furnishes the information that during 1897 his company laid about 60,000 square yards of asphalt block in New York City. This was about 30 per cent. more than was laid the previous year. The International Pavement company and the New Castle Asphalt Block company have also done a good deal of work.

STREET SWEEPERS WHO WORK.

Commissioner Moreland of the Detroit board of public works insists on having for street sweepers men who will perform a full day's work. Recently a delegation of councilmen from Covington, Ky., visited Detroit for the purpose of learning something about the street sweeping methods employed there. Commissioner Moreland is quoted as saying to them: "My sweepers are all Italians, and I even prefer men who cannot speak the English tongue. They have no time to stand and talk politics or visit the corner saloon. They work all the time, and I'll give any man a dollar who finds one of them idle during working hours."

WORK CANNOT BE STOPPED BY TRIVIAL SUITS.

An opinion in the Hayden paving suit, at Denver, Col., was handed down by Justice Campbell Dec. 7, in which he sustained the lower court in its dismissal of the case upon the ground that the complaint was trivial and not in good faith. The original application was for a writ of mandamus to compel Judge Butler to entertain plaintiff's motion of a writ of temporary injunction to cancel and amend a contract for the grading and paving of streets under a contract between the city of Denver and William Hayden. The work on the contract was begun by Hayden, and the temporary injunction was asked to restrain the further carrying out of the contract until a final hearing could be had.

A TOWN MUST PAY ITS WATER RENTALS.

An opinion was filed by Judge Burgess Dec. 14, in the case of Webb City and Carterville Water Works company against the city of Carterville, Mo., in which suit was filed against the defendant for $5,406.75 for hydrant rentals for the years 1892, 1893 and 1894. The city's defense was that the debt was in excess of the city revenues for each year and therefore it was not bound for the debt. The circuit court rendered a judgment for the defendant and the case was appealed to the Supreme Court, which reversed and remanded the case.

A MAYOR'S OBSERVATIONS IN SEVERAL CITIES.

Mayor McGuire and other officials of Syracuse, N. Y., early in December visited Buffalo, Detroit, Indianapolis, Toledo and Cleveland for the purpose of gathering information on municipal questions. In an interview published in the Syracuse Courier on his return Mayor McGuire is quoted as saying:

"I am more and more impressed with the scheme of dividing the city into districts, placing one man over each and making him responsible for the proper cleaning of the territory in his charge. This system is being operated in Buffalo with excellent results.

"We found that the flushing system had been tried and abandoned in many of the western cities, because of its expense or impracticability. Main street in Buffalo is the only thoroughfare which is regularly flushed in that city. Detroit and Indianapolis have given up the scheme.

"We found Cleveland to be a very inferior city," continued the mayor, speaking in detail of the tour. "The pavements are nearly all of stone blocks and some brick. The streets are cleaned by the contract system and very poorly cleaned at that. The same methods are used as in Syracuse—sprinklers and sweepers.

"We were greatly impressed with the methods in vogue at Indianapolis. The city is certainly a model one. It is well paved and finely lighted. There are about seventy-five miles of asphalt pavement. The best pavement is a combination of wooden block and asphalt. The foundation is of concrete, in which are five-inch blocks of southern pine, creosoted, and the surface is made of a quarter of an inch of asphalt. The pavement is expensive, costing about $3 per square yard, but the results are excellent.

"The streets are cleaned by the contract system. They use a pneumatic sweeper, which we may adopt here. The dirt is collected into the sweeper by air blast, and does away with the dust and noise of the present sweeper. It costs about five times as much as the ordinary sweeper, however.

"Detroit has 250 miles of pavement, 900 acres of parks, and 500 miles of street railroads center in the city. On some lines the fare is three cents. The city owns the electric lighting plant, and has operated it for three years at half the cost paid to private corporations.

"About 10 per cent. of the paved streets have asphalt, about 70 per cent. cedar block, and the remainder brick or stone. The authorities there favor cedar block, but we were not very well impressed with it as a paving material. The streets are kept clean by the day labor system.

"The streets of Toledo are cleaned by the day labor system, which has recently replaced the contract system. The city is lighted by arc lamps, at $90 per year each. Half the amount is paid by the abutting property owners and half by the city at large. Toledo has 100 miles of paved streets, mostly brick and block, about one-quarter being of asphalt. The cost of asphalt is $1.80 and brick $1.30 per square yard.

"Buffalo, of course, is the best paved city in America, and I believe, the best cleaned. The day labor system is used, and the city is divided into about sixty districts. Many of the most advanced methods are in operation in Buffalo."

DISINFECTION OF WATER MAINS.

The London Times says that the reservoir and mains of the Farleigh area of water supply at Maidstone were recently disinfected with a solution of chloride of lime, under the personal supervision of Dr. Sims Woodhead, the eminent bacteriologist. Almost ten tons of the lime were mixed in the reservoir with 200,000 gallons of water, and afterward the mains throughout the town were charged at full pressure with the solution. At a certain hour the liquid was allowed to flow through the whole of the house connections in the districts concerned, and eventually the solutions left in the mains was got rid of through the various fire hydrants in the streets. Dr. Woodhead stated that there was no possible danger of typhoid germs remaining in the water pipes after the completion of the process.

PUBLIC WORK IN DETROIT.

The annual report of the board of public works of Detroit, Mich., shows that of the nineteen miles of paving done, eleven miles was new paving, which increased the total length of paved streets to 235 miles. Of the new paving 10½ miles was cedar on concrete, one mile brick and one-fourth mile of cobble paved alleys. Of the repaving four miles was cedar, two and one-half miles brick, three-fourths mile asphalt and one-fourth mile of Medina block. During the year 2.67 miles of public sewers and 12.01 miles of lateral sewers were laid, at a total cost of $207,278 for the sewers and surface draining during the year. Of the $106,716 expended in the road district funds, $56,954 was for street cleaning, $24,836 for washing streets, $9,617 for cleaning alleys and $6,899 for sweeping streets. The cost of cleaning the streets and alleys was less during the fiscal year than any previous year since 1888. The total expenditure by the board during the fiscal year was $1,236,457.

Water Commissioner McGrath's statement shows a total saving per annum in the administration of the water board of $37,621. Commissioner McGrath is endeavoring to have the expense of the collection department largely done away with and other expenses so far reduced that the board will run itself, with the help of about $50,000 from the general tax receipts, in addition to the $75,000 now received from the city.

COUNCILMEN LIABLE FOR WATER WORKS CONTRACTS.

A final decision was filed in the case of Mock vs. City Council of Santa Rosa, Cal.,

Dec. 16, by Judge Dangerfield, in which he holds that the original contract between the council and Effey for the construction of the water works is null and void; that most of the bonds were illegally disposed of by members of the council; that the present council, now possessors of the works, are trustees for the tax-payers of Santa Rosa; that an accounting of the real value of the water works be had in court; that if it is ascertained that the value of the works be less than the bonds when disposed of, judgment for the deficiency shall be entered up against the members of the council; that the city shall have the option of taking the works, provided the old officers agree thereto; that if the old officers do not consent, the sheriff as court commissioner shall sell the water works to the highest bidder. The city can buy, and whatever the city pays shall be credited to the old officers on the judgment for the value of the bonds already found against them.

THE NEW ORLEANS DRAINAGE CONTRACT.

The contract for the construction of the drainage system of New Orleans, awarded to the National Contracting company, will involve the payment of about $8,000,000. The work will be under the charge of Frank P. Mullen as superintendent. The preliminary work is now under way. Many massive dredging machines will be employed in the work. The contract contemplates the erection of a central power house and three pumping stations, a proper outfall to the lake from the several pumping stations, and the construction of underground conduits necessary to carry off the large volumes of water which accumulate in the several portions of the city. The central station will be built on a foundation of 2,500 piles from 60 to 70 feet long. The plant for driving these piles is now being built. The problem of providing proper drainage for the city is one of unusual difficulties on account of New Orleans being below the level of the Mississippi river and engineers have been engaged in studying it for years.

GARBAGE DISPOSAL.

At the recent anual meeting of the New Jersey Sanitary Association held at Lakewood, Rudolph Hering, of New York City, chairman of the committee on garbage of the American Public Health Association, delivered an address on "The Disposal of Garbage." He said the question was still an unsettled one, and that the committee of which he was chairman had examined all the methods in vogue, and that the state could only work out the solution of the problem by experience; there were only two methods in vogue that were good; that by reduction and that by cremation; in Europe cremation only is used; in America reduction is also used; for reduction it was necessary to separate the garbage and meat refuse from the ashes; the soil was taken from the former and made a marketable commodity, while the ashes were used on the soil; the same objection is held against both methods—that of becoming a nuisance in and near cities; both processes are equally good and satisfactory in results; that the choice of methods should be left to local authorities; that localities for the plant should be carefully selected, and that only men of the highest intelligence and experience should be placed in charge.

ILLEGAL ISSUE OF MUNICIPAL BONDS.

The supreme court of Iowa handed down its decision in the case of Osborne et al. vs. the city of Lyons, Dec. 18. In 1894 the city council ordered Sixth-st. paved and the work was done by the Lyons Construction Co. Dr. Osborne and others fought the assessment, and suit to restrain the city from collecting the tax was begun Jan. 4, 1895, the petition setting forth that the contract with the company was illegally made, inasmuch as bids were advertised for the previous year, while the work was not done until the following year; also, that the bonds created an indebtedness in excess of the legal limit set by law, and consequently were invalid. An opinion was filed by Judge Wolfe in 1896, sustaining the property owners in their contention that the bonds were invalid and restraining the city from collecting the tax. In June, 1895, Lyons was consolidated with Clinton, and in 1896 the matter of an appeal was brought before the city council of Clinton, notwithstanding the protests from various property owners that the city of Clinton was not an interested party in the suit, and the costs, if any, should be borne by the holders of the bonds. The supreme court declares the bonds illegal, holding that where the bonds are issued in excess of the legal indebtedness they are void.

STREET PAVING AT NIGHT IN NEW YORK.

Much of the paving work in New York city this year was not awarded till late in the season. In consequence, it has been necessary for the paving companies to push their work as rapidly as possible, and during the comparatively mild weather of December it was a common sight to see large gangs of men employed on the streets all

night. It has not been unusual for residents of the metropolis to find, on awakening in the morning, that the street in front of their houses had been covered with asphalt during the night.

POSTAL SAVINGS DEPOSITS AND GOOD ROADS.

Postmaster-General Gary, in his official report, has favored the establishment of postal saving depositories, but, having failed to offer an adequate solution of the difficulty of safely depositing the deposits, General Roy Stone, the director of the bureau of road inquiry, department of agriculture, has proposed that the deposits should be invested in county bonds issued for road building. It is argued that this will be a safe investment since the money, properly applied to road improvement, will vastly increase the value of property in the county and the bonds thus multiply their own security. "One great advantage of this arrangement," says Gen. Stone, "would be that the money deposited in country districts would come back into circulation there, forming an 'endless chain' of benefits. A further advantage from the road-building point of view, would be that the poor and sparsely settled counties would get their road money at as low a rate of interest as those which are rich and populous. The government could be further secured by the state's guaranty of the bonds, by its own supervision of the road-building, and, if necessary, by the state conferring upon it the right to collect tolls on the roads in case of default in payment of interest or principal."

PORTLAND CEMENT ADMIXTURES IN ENGLAND.

An investigation of the adulteration of Portland cement by grinding with it Kentish ragstone, a kind of limestone, has been made for the London Chamber of Commerce by Dr. Wm. Michaelis and Stranger & Blount of that city. British manufacturers advocate the addition of this limestone, but Dr. Michaelis reports unfavorably to the admixture. Mixtures containing 10, 20 and 50 per cent. of ragstone were made by Stranger & Blount and tested after seven, twenty-eight and 180 days, neat and with sand, in tension and compression. The results indicated that some fresh cements do not show a decrease of strength when mixed with 10 to 20 per cent. of ragstone, but are actually stronger. This result led to further experiments, in which a cement was used that had been subjected to air slacking in the usual manner on public works, the object of which is to hydrate any of the unstable ingredients and prevent any injury to the work by their subsequent expansion, which sets up internal strains in the cement. The use of the aerated cement reversed the results of the previous tests, as, in every case, the ragstone cement was weaker than the pure article. This was proved to be due to aeration alone, by first using the pure cement as it came from the mills, in which case it was inferior to the mixed product, and then using the same cement after a few days' exposure to the atmosphere, when it showed its superiority to the same mixture that had previously surpassed it. The explanation given for this is that grinding the ragstone with the cement in mills had the same effect as weathering. It was also found that the decrease in strength of a mixed cement was not exactly proportional to the amount of limestone added. A mixture of 10 per cent. of stone with cement was more compact that neat cement, which is believed to be an explanation of the fact that a cement containing such a proportion of an inert dilutant is not necessarily 10 per cent. lower in strength than where unmixed.

FRAUDS IN CHICAGO'S WATER DEPARTMENT.

A deficit of nearly $500,000 in the water receipts of the city of Chicago was revealed in a report Dec. 2, to Mayor Harrison, by Expert Harper. The deficit, which occurred during Mayor Swift's administration, is charged mainly to unauthorized reductions of water bills in the ward books of employes. The special water commission was also furnished with facts which gave it an idea of the indiscriminate waste of water, when it was learned that other large cities find a water supply of thirty gallons per capita sufficient for their daily supply, while Chicago furnishes 125 gallons per capita every twenty-four hours. Charges of fraud in the water office have frequently been made, but full details have never before been furnished an official body. The members of the special water commission are W. D. Kerfoot, Owen F. Aldis, L. E. McGann, Superintendent Lange of the water office and Aldermen Barry, Nelson and Ziehne. As soon as the report was heard R. T. Howard, the assistant water assessor, was discharged and it is probable that other discharges will follow wherever any of the old clerks are still in the office.

THE PHILADELPHIA GAS LEASE.

The court of common pleas has refused to enjoin the mayor and other city officials of Philadelphia from executing the lease of

the city gas works to the United Gas Improvement company for a period of thirty years. A bill in equity was filed by certain citizens to test the legality of the ordinance passed by the city council giving control of the gas works to the company. The company agrees to expend the sum of $15,000,000 or more, if necessary, in improvements and repairs and to also reduce the price of gas.

ASPHALT DEPOSIT IN MISSOURI.

A deposit of asphalt of unknown value has been discovered on the grounds of the Confederate Home, at Higginsville, Mo., and three propositions to lease it are said to have been received by the board of managers. Specimens of the asphalt have been submitted to the state geologist and the attorney-general has given an opinion touching upon the right of the board of managers to lease the grounds. W. S. Forman of E. St. Louis, Ill., is said to be at the head of a syndicate in which C. C. Branson, L. Kreickhaus and Newton Evans are interested, which is trying to obtain a lease. Propositions have also been received from Contractor Sanderson of Moberly, Mo., and from a Kansas City, Mo., man. James Bannerman, St. Louis, Mo., is president of the board of managers.

A PAVING LAW DECLARED UNCONSTITUTIONAL.

The law under which the board of aldermen of Paterson, N. J., proposed to repave the streets of that city with asphalt has been declared unconstitutional by the Supreme Court. An ordinance was passed by the aldermen, over the mayor's veto, to issue bonds for paving certain streets in the center of the city with asphalt. The law allowing the issue for "repaving" streets, however, did not require adjoining property-owners to bear any share of the cost, and did not provide for the repayment of the bonds in any specific way. This was in direct opposition to the opinion of Mayor Hinchcliffe, who thinks the repayment of the bonds should be provided for by a sinking fund and that the property-owners should pay a fair proportion of the expense. Mayor Hinchcliffe's opposition led him to make application to court for an injunction, which was granted.

LIMIT OF INDEBTEDNESS IN CALIFORNIA.

A decision of the supreme court, rendered at San Francisco, Cal., emphasizes the state law providing that no county, city, town, etc., shall incur indebtedness which exceeds in any year the income and revenue provided for that year, and that indebtedness incurred contrary to this provision shall be void. The case in which the decision was rendered affected the city of Vallejo, which made a contract for a certain amount of water pipe, which was delivered and paid for with the exception of $90.85, the special fund for that purpose that year being exhausted. Suit was brought for the amount, the lower court deciding in favor of the city and the supreme court affirming the judgment of the lower court.

A COUNCIL ORDERS PAVING WITHOUT ADEQUATE AUTHORITY.

A decision has been rendered by Judge Letton of the district court, Beatrice, Neb., in the case of Kelly vs. Bradt. Mr. Bradt protested against the levy and payment of paving taxes on certain property, holding that a majority of the property-owners did not sign the petition for paving other certain streets. Judge Letton holds that the city council had no authority to levy and collect the paving tax on the premises in controversy, by reason of the petition for said paving being inadequate and that no jurisdiction was ever vested in the city council to pave the district. The decision threatens to result in a number of suits being brought against the city for reimbursement for paving taxes in the district in question.

WITHDRAWAL FROM PETITION FOR IMPROVEMENTS.

Regarding the right of a signer of a petition for street paving to remove his name, City Attorney Norris of Denver, Col., gave an opinion to the board of public works of that city Dec. 11. City Attorney Norris is of the opinion that a signer cannot remove his name after the petition has been received by the board and acted upon; that the question as to the particular time when the right of a signer to withdraw his name ends is one of some difficulty; that in his opinion the board of public works has jurisdiction over the matter of improvement as soon as the petition is received and filed, and that after that is done it will be too late for a signer to withdraw his name; that any construction or policy would leave the board at the whim of the signers and it would never be sure whether it had a petition that would give it jurisdiction to act.

FEDERAL INVESTIGATION OF THE WATER SUPPLY.

Action is being taken at Washington preliminary to the appointment of a federal commission of medical experts to investigate the pollution of the waters of Lake Michi-

gan and possibly of the Mississippi river in the vicinity of its junction with the Illinois river. At the suggestion of Surgeon-General Wyman, Secretary Gage has asked congress, in his report, for a "commission of medical officers to investigate the sources of pollution of streams and water supplies of towns and cities where pollution affects the people of more than one state."

OHIO STATE WATER WORKS ASSOCIATION.

The organization of a State Water Works Association, to be devoted to water works interests, is proposed in Ohio. C. W. Wiles, superintendent of the Delaware Water Co., Delaware, O., is ascertaining the opinion of the water superintendents throughout the state regarding the proposition.

TECHNICAL AND TRADE MEETINGS.

The Illinois Clay Workers' Association will hold its annual meeting at Decatur, Ill., Jan. 5 and 6, 1898. W. S. Purington, Galesburg, Ill., is president and G. C. Stoll, Grant Park, Ill., is secretary. Among the papers that will be read will be one by F. Plumb of Streator on "Burned Clay for Road Purposes."

The tenth annual meeting of the Iowa Engineering Society will be held in Cedar Rapids, Ia., commencing Jan. 19, 1898. Practicing engineers generally are invited to attend. Seth Dean of Glenwood, secretary and treasurer.

The forty-fifth annual meeting of the American Society of Civil Engineers will be held at the new house of the society, No. 220 W. Fifty-seventh street, New York City, Jan. 19 and 20.

The Engineers' Club of Philadelphia celebrated its twentieth anniversary Dec. 17 by a dinner at the Manufacturers' club. Toastmaster John Berkinbine introduced the following: "The Engineering Profession," Prof. Henry W. Spangler; "Municipal Engineering," George S. Webster; "Mechanical Engineering," John H. Converse; "Mining Engineering," Henry N. Chance; "Electrical Engineering," E. A. Scott; "The Past, Present and Future of the Club," Wilfred Lewis.

The Engineering Association of the South, at its meeting Dec. 9, accepted an invitation from Capt. John Biddle to hold future meetings at the offices of the United States Engineers. In describing "An Investigation of Some Tennessee Cement Materials," Robert L. Lund of Vanderbilt University said all samples of rock tested gave evidence of hydraulicity, but none of them, after six months, had attained any degree of hardness. All were quick setting, and, with one exception, all were light in color, due to excess of magnesia. All samples tested were deemed unsuitable for the manufacture of cement. An address was made by Retiring President Locke on "Good Roads," in which he pointed out practical means by which improvements could be brought about, and urged the association to take the lead in a campaign of education. The committee on good roads was continued with instruction to prepare a plan of action. J. S. Walker, the new president, presided at this meeting.

A meeting of the New England Water Works Association was held in Boston Dec. 8. The following papers were read: "Construction of the Water Works at Newport, N. H.," Lucian A. Taylor, Boston; "Placing a Ten-inch High Service Pipe Across a River," Frederick W. Gow, superintendent, Medford; "Backfilling Trenches," E. A. Hammett, Boston.

The eighteenth annual meeting of the Indiana Engineering Society will be held in the State House, Indianapolis, Jan. 4, 5 and 6. The program includes an address by A. W. Smith, C. E., of Kokomo, president of the association followed by papers as follows: "For the Good of the Profession," F. M. Cunningham, surveyor of Sullivan county; "Road and Road Building," J. F. O'Brien, Cloverdale; "The Business End of Civil Engineering," C. G. H. Goss, C. E., Martinsville; "How We Make Ditches in Jasper County," John E. Alter, Rensselaer; "Large Open Drains," L. S. Alter, Remington; "Methods of Construction and Assessments for Tile Drains," J. W. Fawcett, C. E., Delphi; "Cement," J. W. Dickinson, Chicago; "Bituminous Grout Filler for Brick Pavements," J. W. Ford, Chicago; "Brick vs. Asphalt for Small Cities," H. L. Weber, C. E., Richmond; "The Municipal Engineer," A. J. Hammond, C. E., Frankfort; "Engineering Expert Testimony," Prof. R. L. Sackett, Richmond; "The Columbia City (Indiana) Sewer System," C. G. H. Goss, C. E., Martinsville; "The Relation of the Board of Health to the Engineer," Dr. J. N. Hurty, secretary Indiana State Board of Health, Indianapolis; "The Arch as Used in the Construction of Bridges," Malverd A. Howe, professor of civil engineering, Rose Polytechnic Institute, Terre Haute, "Iron Tunnels and Tunneling," Fred Morley, professor of civil engineering, Purdue University, Lafayette; "Some Difficulties Encountered in City Surveying," H. B. Fatout, Indianapolis.

Arrangements have been about completed for the annual meeting of the National Brick Manufacturers' Association at Pittsburg, Feb. 15 to 18. The usual arrangement

for a railroad rate of a fare and one-third for the round trip, on the certificate plan, has been made. The program includes papers on "The Advancement of Paving Brick Tests," by Arthur W. Sewall, Pittsburg; "Brickmakers' Accounts," W. H. Hoagland, Cayuga, Ind.; "The Refractory Qualities of Clay," by Prof. Edward Orton, Jr., Columbus, O.

The Montana Society of Civil Engineers will hold its annual meeting in Butte, Jan. 8 next.

RESURFACING OF ASPHALT STREETS.

To the Editor of Municipal Engineering:

In the report of the committee on street paving there is one section which I desire to correct. Section 6 of the recommendations of the committee reads as follows:

"Should it be found necessary to replace 25 per cent. or more of any section of the street with new material the entire section shall be resurfaced."

Kindly change this 25 per cent. to 40 per cent.

A. D. THOMPSON,
Chairman of Committee on Street Paving.

Peoria, Ill., Nov. 30.

THE CREDIT BELONGS TO ENGINEERING MAGAZINE.

"Credit to whom credit is due" is regarded as a golden rule in the editorial management of Municipal Engineering Magazine, but it sometimes happens that mistakes are made in trying to live up to it. We are in receipt of a letter from Mr. Charles B. Going, managing editor of the Engineering Magazine, calling attention to an instance of this kind, as follows:

"Municipal Engineering for December, on page 383 credits a short article on 'Benton Tanks' to the London Surveyor, which in turn refers to it as coming from a German contemporary. The text, however, is almost word for word identical with one of our reviews on page 812 of our issue for August last. Short articles of this kind drift so far and so fast that they often lose the owners' marks. As our translation of the abstract was used, however, I think that we and not the London Surveyor should have the credit. If you will compare the two paragraphs, you will notice that the language is identical."

COST OF STREET CLEANING IN PHILADELPHIA.

To the Editor of Municipal Engineering:

Allow me to correct an error published in your issue of December, 1897. On page 383 I find among other statements the following: "The entire city of Philadelphia expends this year for street cleaning over $560,000."

This is a misstatement which should be corrected in justice to our city. The contract price for street cleaning this year is $520,594. This amount pays for cleaning 980 miles of streets, over 16,000 sewer inlets and the removal of ashes and all other dry waste once each week from over 250,000 buildings.

SYLVESTER MARTIN,
Chief of Bureau of Street Cleaning.

Philadelphia, Dec. 4.

The statement referred to by Mr. Martin appeared in an article from the Columbus, O., Press, published in our department of "Selections from the Press."

MUNICIPAL REPORTS.

Annual Report of the Street Department of the City of Boston for 1896. 490 pp. By Benjamin W. Wells, Superintendent of Streets.

This report, like others issued by the street department of Boston in the last seven years, is a thorough review of the public work done under the direction of the street superintendent, embracing reports in detail from the deputy superintendents in charge of the various divisions. Much important work was done during the year covered by the reports. The expenditures amounted to $4,687,378. The city operates its own stone crushing plants, of which it has seven, the output of which was 157,394 tons of crushed stone and 16,354 tons of telford. Boston now has 446 miles of sewers. During the year 116,008 lineal feet were built by day's labor. The expenditures of the sanitary division amounted to $477,241 for the collection of 363,975 loads of house dirt and ashes, and 56,462 loads of offal. The expenditure for street cleaning was $310,266 for cleaning 12,089 miles of streets and removing 112,961 loads of dirt. The paving work embraced 51,500 square yards of brick, granite block laying on forty-five streets and 13,647 square yards of artificial stone sidewalks. The sewer division built over twenty-nine miles of sewers and 346 catchbasins, besides much repair work. The report contains an unusual number of illustrations, showing views of improvement work in Boston, several of which are reproduced in Municipal Engineering by the courtesy of Mr. Wells.

A Report by the Joint Special Committee on Street Pavements, Recommending the Adoption of Asphalt Pavement by the City of Providence, R. I. By Samuel Whitely, chairman, and Robert E. Smith, commissioner.

This committee was appointed last April. The report is based largely on correspondence. It quotes a well-known physician as saying asphalt pavements contribute largely to the health of a community, and in support of the statement mentions the decreased death rate in Buffalo since the extensive use of asphalt. The report says: "All of the testimony presented to your

committee in the form of letters, printed documents and personal interviews with men interested in observing highway improvements, led your committee to the conclusion that asphalt pavement was the coming surface for roadways in large cities and towns because it can be laid cheaper, repaired easier and better, kept cleaner and more attractive than any other kind of street covering. Objection has, and is made to the slipperiness of asphalt and the danger of horses falling upon it. Experience in the large cities in this country and Europe, where asphalt has been extensively used on streets devoted to all classes of travel, show that horses soon become educated to traveling on asphalt, and that the average of horses falling is about equal upon an asphalt street and on a street where granite blocks have been laid for some time. Although your committee were convinced of the desirability of an asphalt pavement for certain locations, yet before reporting on this question to the City Council they deemed it advisable to confer with some of the authorities in other cities where asphalt has been used for some years."

Among the letters is one from Gen. C. H. T. Collis, commissioner of public works in New York City, in which he says that the popular demand for asphalt pavements has encouraged him to substitute them for worn out granite pavements. He calculates the cost of asphalt pavement in New York City at 20 cents per square yard per annum for a period of fifteen years. Regarding construction, Gen. Collis says: "To make a durable asphalt pavement it must be more or less yielding for the first season. If it is made hard and unyielding from the start it is liable to scale off under heavy traffic and cold rain, and will always be more slippery than a pavement which at first yields slightly to wheel pressure."

Commissioner Robert E. Smith reports the relative cost of cleaning sewer catch-basins located on asphalt, granite block and macadam as follows: Asphalt, $2.04 each; granite block, $2.28 each; macadam, $3.76 each. On asphalt streets the cost was largely increased on account of the lateral streets having macadam. Mr. Smith was asked by the council to furnish an estimate of the cost of a municipal asphalt plant. He reports that it would probably cost $30,000.

The Annual Report of the Board of Water Commissioners to the Mayor and Common Council of the City of Watertown, Wis., for the year ending Sept. 30, 1897.

The commissioners report the plant as self-sustaining without the aid of taxes, after being in operation a little over a year. The total operating expenses are at the rate of 3.4 cents per 1,000 gallons of water consumed.

CLAY CURBSTONES IN GERMANY.

A mixture for the manufacture of clay curbstone, gutters, drains, etc., is used in Germany, which consists of the following: Clay, 91½ parts; iron fillings, 3 parts; common salt, 2 pints; potash, 1½ parts; ash of elder or willow wood, 2 parts. Directions for coloring the mass are: Violet brown color, two parts of pyrolusite to 100 parts of the mass; violet, 1 part of pyrolusite; green, 1 part of copper scales; blue, 1 part of oxide of cobalt; yellow, 2 parts of oxide of antimony.

PERSONAL.

George W. Fuller, C. E., has been appointed superintendent of the experimental filtration beds of the new water works at Cincinnati, O.

T. E. Whitlake has been appointed superintendent of sewers, and Robert E. Baldwin superintendent of streets at New Haven, Conn.

John D. Moore has been elected water commissioner to succeed J. T. Warlich, at Rome, Ga.

John A. St. Louis has been appointed water registrar at Marlboro, Mass.

M. L. Holman, water commissioner of St. Louis, Mo., has returned from a European trip

Forrest A. Coburn, secretary of the Civil Engineers' Club, Cleveland, O., died in that city Dec. 1.

Thomas S. Drake has been reappointed sewer commissioner for a term of five years at New Rochelle, N. Y.

John W. Ross, a commissioner of the District of Columbia, has resigned his position on account of ill health.

Philip Prioleau has been appointed city engineer at Jacksonville, Fla.

James I. Blakeslee, president and general manager, and Daniel Clark, superintendent of the Hazleton Water company, Wilkesbarre, Pa., have resigned.

Mr. Harvey C. Lowrie, for many years city engineer of Denver, and whose work in that position is no less a cause for lasting gratification to Denver people than a monument to his engineering ability, has been in the East on a visit recently on business connected with contemplated new enterprises.

Andrew Rosewater, C. E., Omaha, Neb., is delivering a series of lectures before the Civil Engineering club of the State University, at Lincoln, Neb. His second lecture was delivered Dec. 9, his subject being "The Engineer As a Factor in Municipal Government."

J. H. Spangler has been appointed engineer in charge of all tunnel work, and W. D. Barber as engineer in charge of section 3 of the new southwest water tunnel of Chicago, succeeding J. H. Flagg and Assistant Engineer Barnes, recently dismissed by the commissioner of public works.

S. H. Shearer has resigned his position as superintendent of the Western Paving & Supply Co. at Indianapolis. Ind., Ezra D. Hill has been appointed manager and Geo. H. Royce, cashier, has been appointed secretary.

William Boldenweck has been elected president of the drainage board at Chicago, Ill., to succeed Thomas Kelly.

T. T. Johnson, chief engineer, Chicago, Ill., lectured before the Lewis Institute, Dec. 3, on "Cement Masonry As Used on the Drainage Canal."

Maurice J. Power has been appointed acqueduct commissioner at New York City to succeed the late James C. Duane. Mr. Power was formerly shipping commissioner.

W. S. McHarg has been appointed consulting engineer for the new system of interlocking sewers to be built at Chicago, to carry the sewage to the drainage canal instead of to the lake.

Hiram Phillips, M. Am. Soc. C. E., has been appointed consulting sanitary engineer to the Missouri State Board of Health, and will report on the water supply of the state. The question of sewage disposal will be considered in a later report.

John F. Shoe has been appointed superintendent of the water works and electric light plant at Newark, Del.

D. C. Camp has been elected Water Commissioner at Atlanta, Ga.

Dr. Thomas W. Graydon, Cincinnati, O., has resigned his office as a member of the water works commission.

Chas. F. Grainger, T. L. Jefferson and Thomas P. Satterthwaite, Jr., have been appointed members of the board of public works at Louisville, Ky., and Clarence Parsons succeeds J. H. Pearsons as city engineer.

Garwood Ferris has been appointed supervising engineer of the water department to succeed Wm. H. Hooker at Jersey City, N. J.

John A. Broadwell, formerly superintendent of sewers at Newark, N. J., has been reappointed to succeed Andrew J. Breidenback, resigned.

MACHINERY AND TRADE.

TEST OF A LARGE SUPPLY OF WATER PIPE.

An expert investigation of all the water pipe contracted for by the city of Chicago with the Addyston Pipe & Steel Co. of Cincinnati resulted in its rejection pending an inquiry into its character. The contract for a year's supply of pipe was given the company, amounting to $600,000, and the work of testing was awarded to the Pittsburg Testing Laboratory. A charge was made by John C. McGinn of Hunt & Co. that the pipe furnished by the Addyston company was not up to specifications. If the test proves the pipe below the standard it will be condemned and sent back to the manufacturers.

QUICK CONSTRUCTION OF AN ASPHALT PAVING PLANT.

P. C. Brennan, assistant superintendent of machinery for the Barber Asphalt Paving Co., has earned the credit of constructing an asphalt paving plant at Jamaica, L. I., in eighteen days, with a capacity of 2,250 square yards per day each of binder and surface, and a crusher with a capacity of 150 cubic yards per day. The plant was built to provide facilities for carrying out the paving contract awarded the Barber company early in October.

THE PUMPING MACHINERY FOR CINCINNATI WATER WORKS.

When the bids for constructing the pumping machinery for the new water works at Cincinnati were received, Nov. 30 the Lake Erie Engineering Works of Buffalo were the lowest bidders on all three of their designs, ranging from $296,250 to $370,500, being followed closely by A. G. Moore & Co., at $371,000 and the Lane & Bodley company, $387,000, both of Cincinnati. The highest bid was by E. P. Allis & Co., Milwaukee, $475,000. Great pressure has been brought to bear upon the board to let the contract to the local bidders under close restrictions regarding employment of local labor. The question of time for building the machinery will be taken largely into consideration and the water works commissioners are inclined to allow the bidders the full five years. A meeting was held by the commissioners, Dec. 17, to receive the engineer's report on the computation of bids for the machinery and it was thought probable that the contract would be awarded Dec. 28.

PINGREE'S VENEZUELAN ASPHALT.

Governor Pingree, of Michigan, says that his option on Venezuelan asphalt deposits is for $80,000, and is good till the end of January. He says that he now has two engineers there investigating the property to see whether the asphalt is valuable, but it is so inaccessible that he is doubtful whether it will be practicable even to export it for paving purposes. Otto E. C. Guelich has publicly charged that Pingree is unfairly attempting to get control of concessions on which he holds proprietary rights, and a personal controversy in Detroit newspapers has resulted, in which the charge is made that Guelich offered to let Pingree into the Venezuelan deal if Pingree, when mayor, would appoint him a commissioner of public works in Detroit. This statement, Mr. Guelich says, is false, as he never sought or desired the appointment.

NEW PLANS OF THE TRINIDAD ASPHALT COMPANY.

At a meeting in New York on December 28 the stockholders of the Trinidad Asphalt Company considered recommendations of the directors for liquidating the capital of the company and for extending the business on new and broader lines. It was decided to increase the capital of the company from $3,500,000 to $5,000,000. English capital will be admitted to the company and the business will be vigorously pushed in London, where an office will be opened.

NOVACULITE AS A PAVING MATERIAL.

Novaculite, the new paving material which is in use in several places in Illinois and regarding which many inquiries have been received, is an uncrystallized quartzite, being 98 per cent. pure silica and entirely free from lime or other alkaline substance. It is obtained from quarries in southern Illinois. Some forms of it are used for razor hones. Prof. J. B. Johnson says it resists all disintegrating action of the weather. He expresses the opinion that it possesses superior qualities as a paving material. He says: "By making a foundation of limestone blocks, such as is used for the ordinary telford pavement, and covering this with some five or six inches of the coarser novaculite material, with its bond, and rolling this hard, and then laying two inches of the finer or screened novaculite and bond, and rolling this thoroughly into a solid mass, like concrete, an ideal pavement for resident streets is obtained."

It is estimated that a telford pavement on a sixty-foot street with a top dressing of crushed granite rolled with steam roller, granitoid curb and gutters on a base of concrete, will cost $4.62 per front foot, while ten inches of novaculite on a nine-inch course of cinders, thoroughly rolled and bonded, with granitoid curbing and gutters on a base of concrete will cost $3.15 per front foot.

RECENT INVENTIONS.

(Reported specially for MUNICIPAL ENGINEERING, by Arthur M. Hood, Indianapolis, Ind. Copies of any patent may be obtained for 10 cents.)

593,980—Nov. 23, 1897.—Machine for Melting Snow from City Streets, F. H. Bullis, Brooklyn, N. Y. A truck provided, at its front end, with a rearwardly and upwardly platform, the front end of which lies close to the ground. The main body of the truck carries suitable fire boxes, over which is mounted an inclined platform. Over the two platforms runs an endless conveyor, which feeds the snow up and then to the rear along the heated platform.

594,141—Nov. 23, 1897.—Trench Machine, Hermann Nettelseck, Buffalo, N. Y. A truck on which is mounted a vertically adjustable frame which carries a series of vertically-cutting disks and an endless belt, provided with a series of horizontally-cutting buckets, which also serve to remove the loosened material from the trench.

594,238—Nov. 30, 1897.—Land Roller, Joseph A. Fisher, Christianburg, Va.

594,397—Nov. 30, 1897.—Street Sweeper, H. E. Hawk, Cleveland, O. A sweeper apron consisting of sprocket chains, to the links of which are secured a series of flat pieces which carry the brushes and secured to each of the flat pieces is a plate which bridges the opening between the adjacent pieces.

594,503—Nov. 30, 1897.—Street Sweeper, W. T. Urie, Kansas City, Mo. The sweepings are delivered by the brush into a transverse casing, in which are mounted two conveyors, which convey the sweepings toward the center of the machine, from which point they are carried up and back by a third conveyor.

594,847—Dec. 7, 1897—Sewage or Like Precipitating and Filtering Tank. J. E. Bennett and H. Beresford, Manchester, England. A tank provided with a series of inclined partitions leading to hopper-like depressions in the bottom. Leading from the bottom of each hopper is a siphon pipes through which the solid matter gathered in each hopper may be forced by the head of fluid in the tank.

594,998—Dec. 7, 1897—Conduit for Electric Wires. R. W. Lyle, Perth Amboy, N. J. A conduit having longitudinal and transverse scorings or grooves thinning the walls of the conduit so that a small portion may be easily broken out.

595,072—Dec. 7, 1897—Snow-Melting Machine. A. P. Smith, New York, N. Y. A steam boiler and melting chamber carried upon suitable trucks. The smoke flues are carried through the melting chamber and the steam is discharged through said flues and into the melting chamber.

595,506—Dec. 14, 1897—Fire Plug. E. C. Wiley, Lynchburg, Va.

TRADE NOTES.

The Milwaukee Brick and Cement company, Milwaukee, Wis., contemplates the manufacture of cement from the natural rock which is to be found on its property.

The company name of W. S. Ravenscroft & Co., brick manufacturers of Daguscahonda, Pa., has been changed to the Dagus Clay manufacturing company.

The David Folz Asphalt Paving company, Cincinnati, O., has been incorporated by Frank W. Folz, William C. Hahn, Joseph E. Chuck and Drausin Wulsin. The company will engage in paving streets and roadways with asphalt and do general contracting in Ohio and Kentucky.

The Standard Asphalt company of Logan county, Kentucky, has filed amendments to their articles of incorporation.

The Chattanooga Roofing and Paving company, Chattanooga, Tenn., has been granted a charter. The company has acquired the plant of the local roofing company and will improve it. It will also erect a $10,000 or $12,000 plant at Atlanta, Ga.

The Michigan Pipe company of Bay City, Mich., secured a contract, at Cleveland, O., for furnishing creosoted paving blocks of pine and tamarack, creosoted pine plank and wheel guards for Pearl street.

A large stone crushing plant will be erected in addition to the present plant of the Newark Lime and Cement company, Roundout, N. Y.

Fire destroyed an asphalt factory at Bacaloca, Spain, burning five persons to death and injuring thirty-six.

The sewer pipe manufacturers east of the Mississippi river at a recent meeting in Pittsburg, Pa., Dec. 20, agreed to the formation of a pool with a central selling agency. Another meeting was agreed upon, to be held soon after the holidays, when it is believed a new plan will be carried into effect.

The Humbolt Brick Manufacturing Co., Humbolt, Kas., has been organized to manufacture dry pressed, building and vitrified paving brick, fire brick and drain tile.

The brick plant of R. M. Matson Sons & Co., Falls Creek, Pa., will be enlarged during this winter, and in addition to building brick the company will manufacture paving brick and drain tile.

The Pitch Lake Asphalt Company, Chicago, Ill., has been incorporated by E. Nanisch, R. Frewin and John R. Williams.

In the December number of Municipal Engineering appeared a notice concerning the Whittaker Cement company, Whittaker, N. J. This is the old original name of these works, but they are now better known as the property of the Alpha Cement company.

The syndicate which is to establish extensive cement works in the vicinity of Wawasee, Ind., is preparing for a plant with a capacity of 1,000 barrels a day.

Fred A. Twamley, secretary of the board of public works, Grand Rapids, Mich., says there has been some talk of purchasing another steam road roller this winter, but it is not probable that anything will be done.

Corbette & Stadler, mfrs. of water works standpipes and steam boilers, Aurora, Ill., have made an assignment to S. E. Shepardson.

The Mack Paving Co., New York City, has been incorporated with John M. Mack, James M. Mack and Joseph P. Mack of Philadelphia and others, as directors.

The city council of Ottumwa, Ia., contemplates the purchase of a stone crusher.

The bridge manufacturers held a meeting at Cleveland, O., Dec. 22, to consider the formation of a trust for the construction of an immense rolling mill for the common use of all the manufacturers of bridges. A special committee on reorganization was appointed to report on the valuation of the bridge plants of the country, which will make its report early in the year, when another meeting will probably be held in New York. The combination will be capitalized at an enormous sum, possibly $15,000,000. Nearly every prominent bridge manufacturer in the United States was represented at the meeting.

IMPROVEMENT AND CONTRACTING NEWS

PAVING.

Sacramento, Cal.—The residents of this county have voted to issue $75,000 in bonds for the purpose of building a macadam road between this city and Folsom, 23 miles.

Elkhart, Ind.—Resolutions have been adopted by the common council for paving Main, State, Division, Pigeon, High, Franklin, Marion and Harrison streets with brick.

Jacksonville, Fla.—The board of public works has in contemplation the paving of Main-st., from Hogan's Creek bridge to Eighth-st., with De Leon or Volusia shell.

St. Paul, Minn.—Plans have been prepared by the city engineer for boulevarding Iglehart-st., from Wabasha to Lexington ave., about 12,000 ft., curbed with granite.

Richmond Hill (L. I.), N. Y.—A petition has been presented to the trustee for macadamizing a section of Atlantic ave., in the western section of the village. Trustees Magee and Jordan interested.

Chattanooga, Tenn.—City Engineer Hooke estimates the cost of relaying the pavement on E. Ninth st., between Georgia ave. and A st., as follows: Asphalt, $3,015; brick, $2,432; macadam, $3,860.

Ypsilanti, Mich.—(Special.)—N. B. Harding, mayor, says the paving question is receiving serious consideration and positive action will probably be taken this spring. Brick seems to be the favorite material.

Adrian, Mich.—About three miles of brick paving will be constructed during the coming season and the remaining cobblestone pavement that has not been torn up will probably be covered with asphalt.

Syracuse, N. Y.—A resolution has been adopted ordering the paving of N. Warren st., from the Erie canal to James st., and James st., from the Oswego canal to N. Warren st., with asphalt, asphaltina or vitrified brick.

Rossland, B. C.—The construction of a highway to Cascade City, at an estimated cost of $1,000 a mile, is favored by the board of trade of this city. A. C. Galt, Smith Curtis, H. Leakmann and Wm. Dunn may be addressed.

Ann Arbor, Mich.—A resolution was passed by the common council Dec. 6 referring the petition for paving and curbing Main st., between Catherine and Liberty sts., to the board of public works for investigation.

Raleigh, N. C.—The greater part of the $50,000 street improvement bonds will be used in curbing and grading sidewalks and streets, paving gutters and constructing underground drains. W. Z. Blake, city engr.

Albany, N. Y.—Specifications have been authorized for paving with vitrified brick Second st., from Colby to Watervliet ave.; Colby ave., from Central ave. to Second st.; Hunter ave., from Watervliet ave. to Colby st.

Long Island City, N. Y.—Plans and specifications have been authorized for macadamizing the road leading from Glen Cove, through Locust Valley, to Bayville, a distance of five miles, and the shore from Glen Cove steamboat dock to Roslyn.

Des Moines, Ia.—The council will take final action Jan. 3 on the resolution to pave with brick Tenth st., from Center to School; Pleasant st., from Eleventh to Fifteenth; Eleventh st., from Forest to College, and Fourth st., from School to North.

Peoria, Ill.—A resolution has been passed by the board of aldermen to pave S. Adams st., from South to Western aves., with small brick. Estimates for macadamizing S. Center, S. Yellow Springs and Clifton sts. have been authorized.

Hartford, Conn.—The street board decided Dec. 16 to adopt an 8-ft. strip of asphalt on each side of Asylum st. west of the railroad station to the intersection of streets on the Hill, for the use of bicyclists. The remainder of the street will be paved with granite blocks.

Toronto, Ont.—Application for legislation which will enable the engineer to lay a pavement of a certain standard upon any street of the city which in his opinion needs paving will be made by the city council at the present session of the Provincial Parliament. Light asphalt for residence streets is favored.

Syracuse, N. Y.—The city engineer submitted plans and specifications Dec. 20 for paving Canal st., from N. State to Townsend, with vitrified brick or sandstone and S. Salina st., from Water to Onondaga st., with asphalt. Petitions will be circulated for paving Grape and Jefferson sts. with asphalt, asphaltum or brick. Alderman Freeman interested.

St. Louis, Mo.—The board of public improvements adopted an ordinance Dec. 7 for widening Twelfth st. 35 feet on each side, from Washington ave. to St. Charles st. The street will be repaved with asphalt.Ordinances have been passed for improving portions of Elmbank, Jefferson, Eastern and Bayard aves. Geo. H. Martin, clk.

South Bend, Ind.—(Spec.al.)—Washington st., from Circle ave. to Lafayette st., about 23,000 sq. yds., will be paved, but whether with brick or asphalt has not been definitely decided. Petitons are being circulated for paving with asphalt Lafayette st., from Washington to Lake Shore R. R., 10,000 sq. yds., and about 13,000 sq. yds. of E. Jefferson st.

Baltimore, Md.—Resolutions were adopted by the Harlem Wheelmen, Dec. 6, indorsing sheet asphalt, on concrete foundation, for all new smooth pavements to be laid in this city. Mayor Malster signed the ordinance Dec. 9 requiring all street railway companies to pave between and for two feet on each side of their tracks, with the same kind of improved pavement laid on the rest of the streets through which they pass.

Denver, Col.—The board of public works started proceedings, Dec. 17, to order the paving of Sherman ave. with Trinidad lake asphalt, in accordance with a majority petition of the property owners. The property owners on Gilpin ave., between Seventeenth and Eighteenth aves., have decided to at once have the street paved with asphalt. Plans and specifications were adopted by the board of public works, Dec. 10, for paving Eighth ave. paving district No. 1, with Alcatraz asphalt, at an estimated cost of $56,050.87. The board has under consideration petitions for paving, representing about 110,000 yds., and including Broadway district No. 1, 30,000 yds.; Race st., 15,000 yds.; Hugh st., 15,000 yds.; Eight ave., 30,000 yds.; Colfax ave., 30,000 yds. The North Side Improvement Society and the South Side Improvement Society both approve the recommendations of the committee on boulevards, streets and avenues, regarding macadam paving.

Saginaw, Mich.—The Alcatraz Asphalt Company has completed the S. Harrison St. paving.

Frederick, Md.—A resolution has been passed by the aldermen to the effect that wrenever all the property-owners on both sides of a street in any square of the city shall unanimously petition the board, stating they will each bear one-third of the expense of the improvement of the portion of the street bounding on their property by the use of vitrified brick or some other standard material, the board will bind itself to make the improvement, bearing one-third of the expense.

Milwaukee, Wis.—The list of streets to be paved next year is as follows: East Side—Broadway, from Wisconsin st. to Oneida st.; E. Water st., from Michigan st. to the river; Oneidia st., from E. Water st. to the river. South Side—National ave., from Reed st. to Eighth ave. West Side—W. Water st., from Third st. to Grand ave.; Grand ave., from alley between Fourth and Fifth sts. to Eighth st.; Vliet st., from Twelfth st. to Twentieth st.; Walnut st., from Third st. to Twentieth st.; Third st., from North ave. to Burleigh st.; State st., from Third st. to the river.

Niagara Falls, N. Y.—The question of paving Niagara ave., from Main st. to Sugar st., with asphalt, is being agitated.

Indianapolis, Ind.—The board of public works rejected all bids, Dec. 17, for paving Alabama st., from Twenty-third to Twenty-fifth, and New Jersey, from Sixteenth to Nineteenth, with asphalt, and will advertise again in the spring. Morris st., from Meridian to White river, will be improved next spring. Engineers plans have been ordered for asphalt paving and cement walks on New Jersey st., from Twenty-second to Twenty-fifth st., and for cement walks on Broadway, from St. Clair to Eleventh st. City Engineer Jeup has been planning a system for extending and increasing the improved streets of the city, which includes the following: North Side—Noble st., fr. Washington to Massachusetts ave.; all the east and west sts. bet. East and Noble and Washington and Massachusetts ave.; Bellefontaine and Ash sts., as sewers may permit; the east and west sts., bet. Senate and College aves., fr. St. Clair to Sixteenth st.; all sts. bet. Twenty-second st. and Fall Creek, bet. Talbott and Central aves.; the extension of the Ohio st. or Market st. improvement to Arsenal ave.; New Jersey st., from Wash. to Louisiana; Sixteenth st., from Senate ave. to Northwestern ave.; West Market st., fr. Senate-ave. to West st.; Northwestern ave., fr. Sixteenth st. to Thirty-second st. South Side—Merrill st., fr. Virginia ave., to West st.; McCarty and Ray sts., fr. Meridian to West sts.; Morris st., fr. Madison ave. to White river; Madison ave., fr. Merrill to Palmer; Michigan ave., fr. Washington to Rural; Missouri st., fr. Market to South st.

Pasadena, Cal.—The Better Roads Association was organized Dec. 11, for the purpose of securing better roads in this city. Edmund Lockett is president of the association.

Los Angeles, Cal.—City Clerk Hance has been informed by the Engineer Commission at Washington, D. C., to whom samples of the local asphalt were to be submitted for tests, that the tests cannot be made.

Seymour, Ind.—Judge Willard New has decided in favor of the city in the suit brought by the B. & O. Southwestern R. R. Co. to prevent the city and the Capital Paving & Construction Co. from paving two blocks of street along the line of its tracks. The paving will be done early in the spring.

Des Moines, Ia.—George Sims and C. D. Boardman, of the board of public works, made a recent visit to St. Louis, Detroit, Buffalo, Chicago and other cities, for the purpose of gaining information regarding paving, manner of putting it down, the material used and its preparation for use.

Chicago, Ill.—The transformation of the Chicago river into a boulevard, by covering it with a huge masonery culvert, concrete and asphaltum, is suggested by Charles T. Yerkes, whose proposition is that a company be formed with $50,000,000 capital to cover the river, and also, to create an outer harbor for the accommodation of shipping.

Kansas City, Mo.—The Parker-Washington Company has begun mandamus proceedings against the city engineer to compel the award to them of the contract for paving Park Ave., between Ninth and Twelfth streets, with asphalt. Their bid, which was the lowest submitted, was $2 a sq. yd. The city engineer is required to answer early in January.

Chicago, Ill.—The board of local improvements adopted a new standard of specifications for all street paving work, Dec. 8, which is meant to compel contractors to give better returns to the tax-payers for money expended. Under the new rules contractors will be required to guarantee all paving for a period of ten years, and to use nothing but Portland cement in street foundations; a 6-in. concrete foundation will be required for all asphalt and brick pavement, an 8-in. foundation for all granite block pavement, and 17 per cent. cement must be used in all foundations.

Denver, Col.—The board of public works has passed a resolution admitting Alcatraz asphalt in competition with other paving materials. The committee on boulevards, streets and parks, consisting of N. Robertson, J. D. Ross, J. F. Brown, R. R. Wright, Jr., and Geo. L. Goulding, submitted its report Dec. 16. Extensive paving is advised for the residence districts, and, as the general use of asphalt in these districts would amount to a charge in proportion of value of the frontage covered, which would be greater than the property could endure, the committee suggests that these streets be macadamized.

Toledo, O.—A call has been issued for a semi-monthly meeting of the municipal cabinet. In accordance with this a meeting was held Dec. 11, presided over by Mayor Jones, and a paper read by Street Commissioner Ryan on "Toledo's 360 Miles of Streets, What They Are and What They Ought to Be." It was announced that at the next session a paper would be presented either by the superintendent of water works or the chief of the fire department.

Lima, O.—Judge Mooney has denied the injunction to prevent the Columbia Construction company, of Syracuse, N. Y., to proceed with the work of paving Market street with asphalt, the contract for which was awarded to the company July 20, 1897, at $1.80½ a sq. yd. The bids were received July 7 and involved more than a mile of street paving, at an expenditure of about $50,000. Proceedings were begun by J. W. Van Dyke, a citizen, to restrain the mayor from signing the contract.

CONTEMPLATED WORK.

Ford City, Pa.—Street paving is contemplated for next year.

Tacoma, Wash.—Brick paving is being considered for Tenth st. by the council.

Rochester, N. Y.—First ordinances for cement walks on Emerson st have been adopted.

Kansas City, Mo.—An ordinance was passed by the council Dec. 14 for paving N. Third st.

Portchester, N. Y.—The improvement of portions of twenty-five streets has been recommended. P. G. Sands, city engr.

Buffalo, N. Y.—New bids will be asked for repaving Niagara st., from Niagara square to Porter ave., with asphalt.

Erie, Pa.—A resolution was adopted Dec. 16 declaring the city's intention of repaving State st. with asphalt.

Holyoke, Mass.—Brick paving is advised for a number of streets by City Engineer Kirkpatrick in his annual report.

Lansingburgh, N. Y.—Bids will probably be asked in the spring for paving Second ave. Geo. O. Wood, vil. prest.

New Orleans, La.—An appropriation of $30,000 has been asked for paving Canal st. with asphalt. Coun. Sidney Story.

Orchard Mines, Ill.—The council is reported as having decided to authorize the macadamizing of a street at a cost of $5,000.

Dayton, Fla.—A proposition to bond this town for $10,000 for road and street improvements is under consideration by the council.

Marysville, Ky.—The question of paving with brick or asphalt, in the spring, is being discussed by the council. C. E. Brosee, clk. of coun.

Cincinnati, O.—An ordinance was introduced Dec. 20 to improve Delhi ave., from W. Sixth st. to Garfield ave., with granite.

Buffalo, N. Y.—The paving and extension of W. Huron st., from Delaware to Prospect ave., has been recommended to the board of aldermen.

Trenton, N. J.—The property-owners on E. Hanover and Bank sts. are in favor of repaving with asphalt, using the Belgian block pavement for a base.

Baltimore, Md.—The council has made an appropriation for repaving portions of Poppleton and Biddle sts. with Belgian blocks and Gough st. with sheet asphalt.

CONTRACTS TO BE LET.

Terre Haute, Ind.—Bids will be received until Jan. 18, 1898, for improving the sidewalks on Fifteenth st., from Main to Locust st. Chas. H. Goodwin, cy clk.

Sparta, Wis.—Bids will be received until Jan. 15 for furnishing and delivering material for building 700 ft. of stone sidewalk around the court house square. G. Heitman, co. clk.

New Orleans, La.—Sealed proposals will be received until Jan. 3 for paving Claiborne ave., between Canal and Toulous sts., with Trinidad lake asphalt. P. Alph, compt.

Montgomery, Ala.—Proposals will be received until Jan. 3 for paving with vitrified brick portions of Bibb, Washington, N. Perry, N. Lawrence, Jefferson and Monroe sts. R. H. Somerville, treasurer.

St. Louis, Mo.—Sealed proposals will be received until Jan. 7 for paving three alleys with brick on concrete: Pestalozzi st., from Broadway to Ninth, with granite blocks, on sand, and grading two alleys. Robert E. McMath, prest. B. P. I.

Toledo, O.—Sealed proposals will be received until Jan. 3 for paving Nevada st., from Oak st. to Spring Grove ave., with cedar blocks, vitrified blocks or Canton standard bricks. Sealed proposals will be received until Jan. 10 for grading Kelsey ave. Lem P. Harris, cy. clerk.

CONTRACTS AWARDED.

College Point (L. I.), N. Y.—The contract for macadamizing the village streets has been awarded to Tuohy & Co. for $46,565.

Shamokin, Pa.—The contract for paving two squares of Shamokin st. has been awarded to Edward Ryan, of Springfield, O., at $1.63 a sq. yd. for Mack brick.

Camden, N. J.—The contract for building a stone road on Kaighn ave., from Haddon ave. to Browning road, was awarded Dec. 8 to J. R. Stanley for $9,946.32.

Boston, Mass.—The contract for building the Bear Hill entrance road to the Middlesex Falls Reservation, Stoneham, was awarded Dec. 6 to Wasson & Libby, of Marlboro, for $4,137.

Los Angeles, Cal.—The contract for asphalt paving on First st. has been awarded to the Alcatraz Asphalt Paving Co. at 16¼ cts. a sq ft. and 28 cts. a lin. ft. for curbing.

Pittsburg, Pa.—Booth & Flinn secured the contracts for constructing the Girty's Run road and the remainder of the Verona road for $30,670 and $38,447 respectively.

Buffalo, N. Y.—The Utica Paving Co. was the lowest bidder Dec. 21 for paving five streets, as follows: Goodyear ave., $14,500; College st., $3,438; E. Market st., $4,800; W. Market st., $4,500; s. s. Jersey st. bridge, $668.

Waukesha, Wis.—J. F. Bretz & Son, Springfield, Ill., secured the contract Dec. 14 for paving Main st., this city, with Galesburg brick at $1.30 a sq. yd., excavating 20 cts. a cu. yd., and 43 cts. a lin. ft. for curbing.

Washington, D. C.—The Cranford Paving Co. secured a contract for 800 sq. yds. of asphalt paving at $1.90 a sq. yd. The contract for 580 sq. yds. of cement paving around the jail has been awarded to Augustus Lepreaux, of this city, at 54 cts. a sq yd.

New Orleans, La.—The Barber Asphalt Paving Co. has been awarded the contract for paving First st., from St. Charles ave. to Carondelet, 1,200 sq. yds; St. Louis, from Broad to Basin, 3,500 sq. yds; around Central Power Station, 400 sq yds.

New York City—Contracts for asphalt paving have been awarded as follows: Fruin-Bambrick Construction Co., three contracts, $7,238.50, $3,366 and $6,409; Sicilian Asphalt Paving Co., two contracts, $18,302.60 and $840.28; Barber Asphalt Paving Co., one contract, $13,272.75; California Asphalt Paving Co., three contracts, $9,699.15, $9,535.15 and $32,532.63; Warren-Scharf Asphalt Paving Co., two contracts, $3,836.30 and $2,765.70. Contracts for paving in the Twenty-third and Twenty-fourth wards were awarded as follows: Barber Asphalt Paving Co., three contracts, $8,954, $28,490 and $5,329.50; Geo. F. Doak, $42,730; Asphalt Construction Co., $17,792.20; James Flanagan, $10,075.10.

Brooklyn, N. Y.—The contract for the Shore Road construction, Plan No. 3, was awarded Dec. 9 to Harris & Maguire, 485 Flatbush ave., for $29,450. The contract for grading Neptune ave., bet. W. Fifteenth and W. Thirtieth sts., has been awarded to Michael J. Dady for $300,000.

Rochester, N. Y.—Bids were received Dec. 20 for the proposed Medina block pavement on Exchange st., from Main to Erie canal, as follows: Chambers & Casey, $8,301.25; Rock Asphalt Pavement Co., $8,947.75; Whitmore, Rauber & Vicinus, $8,075.50; Wm. Fuller, $8,868.25; H. N. Cowles, $8,735.50; Lauer & Hagaman, $9,463; Gilbert Brady & Co., $10,046; Wm. H. Jones, $10,172.75. No action was taken on the bids.

St. Joseph, Mo.—The contract for paving N. Third st., between Jule and Franklin sts., with asphalt, was awarded, Dec. 15, to the Barber Asphalt Paving Co. at $2.15 a sq. yd. for paving and guttering; 75 cts. per lin. ft. for new curbing; 5 cts. for resetting old curbing, and 14 cts. per lin. ft. for resetting and recutting old curbing.

Denver, Col.—Bids were received Dec. 13 for the paving in Broadway, paving district No. 1 as follows: Denver Paving Co., Pacific asphalt, $1.98 a sq. yd., or $77,133.41; Colorado Paving Co., Trinidad lake asphalt, $2.50, or $88,811.75; F. O. Blake Paving Co., $2.51, or $90,310.99; Thos. J. Tully, Bermudez asphalt, $2.35, or $85,030.40.

Wabash, Ind.—The Barber Asphalt Paving Co. was awarded a contract, Dec. 27, for asphalt paving on Wabash, Canal and Market sts. at $1.95 a sq. yd. and aggregating $24,000. Bids were received in September for asphalting the streets in the business districts, but all the companies bid $2.45 a sq. yd. and the bids were rejected. When readvertised the Barber Asphalt Paving Co. was the only bidder.

Toledo, O.—The contract for paving Fifth st. with Metropolitan block was awarded, Dec. 2, to John C. Carland for $2,602.55, and Twenty-second st., metropolitan blk., Geo. H. Bodette, $1,972.50. H. P. Horan was awarded a contract, Dec. 9, for paving Michigan ave., bet. Lagrange and Chestnut, for $6,361.61. There were ten bids received for paving Warren st., from Bancroft to Delaware ave., about a half mile in length. C. W. McKinney was the lowest bidder on Buckeye block at $11,332, and F. E. Cole the lowest on asphalt at $14,713.60.

Syracuse, N. Y.—The contract for paving Harrison st., from S. Salina to S. State st., with asphalt was awarded Dec. 20 to the Empire Construction Co. for $6,660.30. Bids were received at the same time for paving E. Castle and Water sts., but the contracts were not awarded. The bids received recently for paving Lock st. were as follows: Asphaltina Construction Co., asphaltina, $2,814.90; Warren-Scharf Asphalt Paving Co., Trin. asphalt, $16,818.60; Columbia Construction Co., Trin. asphalt, $12,139; Empire Contracting Co., Alcatraz asphalt, $12,636.70; A. S. Webb, brick, $15,376.90.

Long Island City, N. Y.—Bids for macadamizing 175 miles of roads in the towns of Jamaica, Oyster Bay, Hempstead and North Hempstead are reported as follows: The Mack Paving Co. was the lowest on all of the sections of North Hempstead, 1, 3, 4, 5, 6 and 7 of Oyster Bay and 4 of Hempstead; E. Roche on sections 1, 2, 3 and 5 of Hempstead and W. F. Donovan on section 3 of Oyster Bay. The grand total of all the bids was $1,264,134.90.

Freeport, Ill.—The contract for paving Exchange st. and its intersections was awarded to Hanke & Stuart at $1.02 a sq. yd. for Springfield brick. Bids were received Dec. 15 for brick paving on portions of N. Galena and Clark aves. as follows: Contractor Maffioli, Rockford, quality of brick not specified, $1.07; curbing, 30 cts. Schafer & Co., Galesburg brick, $1.10; Springfield brick, $1.05; curbing, 27 cts. Hanke & Stuart, Galesburg brick, $1.10½; Springfield brick, $1.06½; curbing, 27 cts.

Cincinnati, O.—Bids were received Dec. 22 for paving a portion of Spring Grove ave. with asphalt. This is the first time that California asphalt has competed with the Trinidad and Bermudez products in this city. The price paid per square yard on the last contract was $2.30, while on the Spring Grove ave. contract the lowest bid was that of the Trinidad Asphalt Paving Co. at $1.70 a sq. yd., or 60 cts. less than on the last preceding contract. The other bids received were as follows: Warren-Scharf Asphalt Paving Co., $2.15; Chas. Spinks & Sons, $1.75.

Brooklyn, N. Y.—The contract for grading, surfacing and stone filling plan No. 3 of the Shore road was awarded Dec. 9 to Harris & Maguire for $29,450. Bids were received Dec. 13 for paving, the lowest being as follows: Winthrop st., ordinary curb, Norton & Garman, $8,489.70; J. F. Maillie, combined curb and gutter, $8,374.97; Butler st., Eastern Bermudez Co., $6,510.65; Bergen st., Cranford & Co., $6,647.20. Cranford & Co. were the lowest bidders for resurfacing portions of twenty-one streets with asphalt, their bids being made for wearing surface and concrete foundation separately, and at the following rates: 53,098 sq. yds. asphalt on streets without car tracks, 85 cts. a sq. yd., and 10,179 cu. yds. concrete, $3.90, making pavement complete $1.50 a sq. yd.; 26,158 sq. yds. asphalt on streets with car tracks, $1.10 a sq. yd., and 5,124 cu. yds. concrete at $4.20, making the paving, complete, $1.80 a sq. yd. The Brooklyn Alcatraz Asphalt Co. was the lowest bidder on one street, involving 1,921 sq. yds. at $1.67.

Savannah, Ga.—Bids were received Dec. 18, for paving Drayton st., between Bay and Anderson, as follows: The Southern Asphalt Paving Co., $1.91 per sq. yd., $51,903; the Warren-Scharf Asphalt Co., $2.03 per sq. ft., $54,655.80. With brick: Southern Asphalt Paving Co., $50,523; Georgia Paving Co., $37,-261.38; Cook & Laurie, $37,886; J. E. O'Hearn, $39,247.32; T. H. Lasley, $39,976.80; Southern Fuel and Supply Co., $38,133.78; W. A. Hascall, $36,129.26; J. R. Cronin & Co., $46,706.28; Delaney & Zipf, $41,190.20; Wilkins & Gould, $40,786. Paving from Anderson to Eighth with gravel six inches deep: Southern Paving Co., $17,003.50; Cook & Laurie, $18,176.22; J. E. O'Hearn, $6,627.07; J. R. Cronin & Co., $7,-206.14; Delaney & Zipf, $8,461.72; Wilkins & Gould, $6,768.76. Between Anderson and Eighth sts., with gravel nine inches deep: South Asphalt Paving Co., $18,567.70; Cook & Laurie, $23,236.22.

SEWERS.

Newark, N. J.—All manhole covers for sewers will be weighed on the city scales in the future, and those short of the required weight will be rejected.

Mobile, Ala.—A commission has been appointed to formulate a plan for sewerage and water works for this city, consisting of Col. Edward L. Russell and J. B. Davis, who were appointed by the mayor, and Col. D. E. Huger, Capt. P. J. Lyons and Foster K. Hale, who were appointed by Chairman Kirkbridge, of the general council.

Chicago, Ill.—John W. Alvord, C. E., has devised a plan of intercepting sewers which will take all the sewerage from the rivers and the lake and put it into the new drainage canal at Bridgeport. He estimates that his plans can be carried out, including pumping stations, at a cost of about $5,000,000. It is so devised that a part of the work can be done each year for a number of successive years.

Chicago, Ill.—The city and the drainage trustees have agreed upon a system of intercepting sewers to connect with both north and south branches of the river. The city is to build through conduits from the lake to the river, with pumping stations to operate them, while the drainage board agrees to maintain them perpetually. These main conduits are to be so placed as to control the bulk of the sewerage from both sides of the city.

Evansville, Ind.—In the case of Thomas Murray against certain real estate, Judge Foster decided, Dec. 13, that the city charter provides that the lien for street improvements shall be a prior lien to all other liens, except those for taxes cannot be extended to include sewer liens, and that there being no provision in the charter giving any priority to sewer liens, their priority must be determined by the time of their origin and they cannot take precedence over a prior mortgage.

Madison, Wis.—A second injunction was served on Mayor Hoven and City Clerk Norsman, Dec. 20, to restrain them as officials of the city, from entering into or executing the contract for a sewage disposal plant with the International Sanitary Engineering Co., as ordered by the council Oct. 15, 1897. The temporary injunction is returnable Jan. 5. An agreement had been perfected in the first injunction suit, brought by Dr. R. A. Law, in which he agreed to not press the suit, but to allow the city to go ahead and have the sewage disposal plant installed. D. K. Tenney is the complainant in the last instance, and the grounds on which he seeks an injunction are the act of the council on Oct. 10, 1895, making the city one sewerage district instead of several, as formerly, was illegal, and that in addition to $37,200, the contract price for the proposed plant, there will be required $15,000 more to connect the sewer lines with the plant.

CONTEMPLATED WORK.

Asheville, N. C.—The construction of 1½ miles of pipe sewers is contemplated.

South Bend, Ind.—(Special.)—About three or four miles of brick and pipe sewers will be constructed next year.

Montreal, Que.—An expenditure of $75,000 is estimated for the construction of the proposed St. Dennis ward main sewer.

Rochester, N. Y.—Plans are being prepared for two overflow sewers for the Genesee Valley canal trunk sewer.

Cleveland, O.—A resolution has been recommended for adoption for the construction of a sewer in Evans st.

Sandon, B. C.—The construction of a sewerage system will probably be considered by the new officials after Jan. 15.

Galveston, Tex.—A bond issue of $300,000 has been passed for sewerage purposes, but no plans have yet been adopted.

Media, Pa.—The question of introducing a complete sewerage system in this borough will be voted on in February.

New Britain, Conn.—The subject of the disposal of this city's sewage is being discussed.

Parnassus, Pa.—The question of issuing bonds for a sewerage and water works system will be voted on.

Alton, Ill.—The board of local improvements has decided to construct a sewer in Bluff st.

Ft. Wayne, Ind.—A sewer will be built in South Wayne next spring. Cy. Engr. Randall.

Greensboro, N. C.—The question of constructing a complete sewerage system will be voted on.

Worcester, Mass.—The committee on sewers voted, Dec. 18, to recommend the further construction of the system of separating sewers.

Asbury Park, N. J.—The estimated cost for a sewerage system for the township adjacent to Asbury Park is about $76,000.

Warren, Pa.—Councilman Cable may be addressed regarding the proposed sewage disposal works at the State Hospital.

Houston, Tex.—The construction of 5,640 ft. of 24-in. brick and pipe sewers in Austin st. is contemplated at a cost of $20,000.

Syracuse, N. Y.—The construction of a 90 to 30-in. brick main sewer in the First Ward is contemplated. Alderman Costello interested.

Scranton, Pa.—Plans have been submitted to council by Jos. P. Phillips, city engineer, for a system of sewers in section "E," 5th district.

Los Angeles, Cal.—An ordinance has been adopted authorizing the extension of the sewerage system through several streets.

Liberty, Mo.—The question of issuing $45,000 bonds for the construction of a sewerage and water works system will be voted on Jan. 4.

Newport, Ky.—The question of constructing sewers in District A will be considered again the beginning of the year. Frank H. Covalt, cy. clk.

Depew, N. Y.—New bids will be asked, according to press reports, for constructing a part of the proposed sewerage system. J. P. Coan interested.

Millvale, Pa.—A resolution has been adopted to prepare an ordinance to increase the indebtedness of the town $25,000 for a sewer down Girty's Run.

Ann Arbor, Mich.—Alderman Van Fossen introduced a resolution in the council Dec. 6 directing the city surveyor to make an estimate of the expense of constructing a drainage system.

Des Moines, Ia.—Final action will be taken Jan. 3 on the resolutions for pipe sewers in Buchanan, Lynn, Maple, E. Eighteenth, Walker and other streets.

Hartford, Conn.—Commissioners Hyde and Buths have been appointed a committee to investigate the recent complaints regarding insufficient sewerage facilities.

Holyoke, Mass.—City Engineer Kirkpatrick in his annual report recommends the construction of a number of sewers and a storm-water drainage system this year.

Rochester, N. Y.—First ordinances were adopted Dec. 21 for pipe sewers in Center st., from Jones to State, and Ericsson st., from Irving st. to Park ave.

Ithaca, Mich.—The question of issuing bonds for constructing a sewerage system, which was defeated Nov. 30, will probably be submitted to vote again in the spring.

Winamac, Ind.—The construction of two sewage disposal beds, 100-ft. square, has been recommended for this place by Dr. Hurty, secy. State Bd. Health, Indianapolis, Ind.

Santa Ana, Cal.—(Special.)—S. H. Finley, C. E., says the trustees of Santa Ana have passed an ordinance preparatory to calling an election to vote $65,000 sewer bonds. The election will probably be held in January.

Indianapolis, Ind.—The board of public works decided Dec. 15 to construct a main sewer in Talbott ave. and other streets and alleys, from Twenty-second to Thirtieth st. Final action was taken Dec. 27 for a local sewer in Williams st., from Oriental st. to a point 118 ft. west of State ave.

Hyattsville, Md.—A report was submitted Dec. 15 by W. C. Lyons covering every detail as to the construction and location of the sewerage and water works system, electric light plant, etc. He estimates the cost of the sewerage system at $35,000, and the water works at $30,000. The board of town commissioners took the report under advisement.

Newark, N. J.—Ordinances have been passed for constructing a pipe sewer in Front st. and Lombardy Place and New st. The plans for the proposed new relief sewer for the central section of the city will be filed in City Engineer Adams's office for inspection. The actual work of building the sewer will be delayed no longer than possible. Engineer Adams submitted to the committee on sewers of the board of works, Dec. 21, the first report of the work which is being accomplished in the proposed improvement of the entire sewerage system of this city.

Evanston, Ill.—The city council has decided to act upon the suggestion made by ex-Judge Harvey B. Hurd regarding the drainage system of this city. A committee of seven, including three members of the council, will be appointed to investigate the feasibility of turning the flow of sewage from the east to the west by means of a canal from Lake Michigan, at Grosse Point, north of Evanston, to the north branch of the Chicago river at Lawrence ave. This would include Evanston, Niles, Winnetka, Kenilworth and Wilmette in the main drainage system, and would require only a 9-ft. intercepting sewer on Lawrence ave., instead of a 17-ft. sewer and feeder proposed by the drainage board.

CONTRACTS TO BE LET.

Cincinnati, O.—Sealed proposals will be received until Jan. 4 for constructing sewers

in Clemview and Westminster aves. Bids will be received until Jan. 14 for constructing a trunk sewer in Garfield ave., Boldface road and Ravine. Aug. Herrmann, prest. B. of A.

Toledo, O.—Sealed proposals will be received until Jan. 3 for constructing pipe sewers in two alleys. Lem. P. Harris, cy. clk.

Buffalo, N. Y.—Bids are asked until Jan. 4 for constructing an 18 to 10-in. tile sewer in Edison st. R. G. Parsons, secy. P. W.

Spokane, Wash.—Bids will be received until Jan. 4 for constructing a sewer in Maple st., from Fifth to Eighth ave. B. H. Fowle, secy. B. P. W.

Chamberlain, S. D.—Bids will be received until Jan. 8 for constructing a sewerage and water system. John Flinn, supt. Indian school.

Mt. Vernon, O.—Bids are asked until Jan. 8 for constructing a main and lateral sewer in the eastern sewer district No. 2. P. B. Chase, cy. clk.

Norristown, Pa.—Bids are asked until Jan. 14 for the construction of 4,500 lin. ft. of salt-glazed fire clay pipe sewers on Powell and Main sts. P. Frank Hunter, chrmn. sewer com.

Jersey City, N. J.—Bids will be received until Feb. 15, according to local press reports, for constructing a main trunk sewer to drain 150 acres of land in the Hudson City section.

CONTRACTS AWARDED.

Ford City, Pa.—The contract for constructing the sewerage system has been awarded to W. G. Heiner.

Cincinnati, O.—The contract for constructing the Bloody Run sewer was awarded Dec. 15 to McCarron & Dawson for $34,874.

Denver, Col.—Chas. Connor was awarded the contract Dec. 20 for the construction of the Broadway storm sewer for $62,198.78.

Belton, Tex.—The city council passed an ordinance Dec. 8 granting a franchise to Kelly & Steel of Georgetown for a sewerage system.

Saginaw, Mich.—The contract for constructing a sewer in Gratiot st., between Bullock and Elm, will probably be awarded to Lamson & Crowley for $3,918.40.

St. Louis, Mo.—The Robt. J. Boyd Paving & Construction Co. presented the lowest bid for the construction of sewers in the Duncan ave. district. No. 2 at $29,492.33.

New York, N. Y.—The contract for constructing a sewer in St. Joseph st. has been awarded to James Sheridan of Brooklyn for $42,106. J. R. Byron of Mt. Vernon secured the contract for a sewer in Williamsbridge for $44,323.35.

New York City.—Bart Dunn was awarded the contract Dec. 13 for constructing an outlet sewer in sewerage district No. 27 for $51,847.50; Fred E. Glassen, sewer in Claremont ave., $7,192. Other sewer contracts that have been awarded are as follows: B. J. Sullivan, $111,447.30; M. J. Leahy, two contracts, $60,432 and $3,902.50; P. F. Brennan, $20,956.50; Cunningham & Kearns, two contracts, $12,575.29 and $8,241; Thileman & Smith, $18,208; A. A. Briggs, $13,972; A. S. Traub, $2,446.46.

WATER-WORKS.

Worcester, Mass.—The Metropolitan Water Board has decided to name all the ponds, reservoirs and aqueducts, which will be under its control, the "Wachusett reservoir."

Buffalo, N. Y.—The board of aldermen has adopted the new schedule of water rates as recommended by the board of public works, which provides for a general reduction of 30 per cent. This practically kills the free water plan.

Munising, Mich.—The large reservoir, which had just been completed by the Shaw-Kimball Engineering Co., of Toledo, bursted Dec. 18. The reservoir is 317 feet above the level of the streets. The break was first caused by the cracking of the cement and the water working through the loose dirt.

St. Louis, Mo.—Committees have been appointed by Mayor Ziegenheim to make final arrangements for supplying Kirkwood, Webster Grove, Clayton and Ferguson with water from this city. The committees are Geo. Autenrieth and F. W. Rauchenstein, Clayton; Mayor Frank E. Nevins and Judge Enos Clarke, Kirkwood; Mayor W. S. Fleming and N. D. Thompson, Webster Grove; Le Grand Atwood and C. B. Adams, Ferguson.

Brooklyn, N. Y.—John P. Cranford has made a proposition to this city, in behalf of the Suffolk county syndicate, in which he offers to increase the city's water supply by about 50,000,000 gallons. It will be two years, however, before he can fulfill the contract. The syndicate is a company of capitalists, who have secured extensive water rights between Patchogue and Eastport, the latter place being about seventy-five miles distant from Brooklyn.

Burlington, Ia.—The special committee appointed to investigate and report upon the value of the water works plant and the rights of the city in the property, with a view to municipal ownership, reports that in twenty years the receipts have been $980,242.21 and the disbursements $962,785.07. The cost to the city to purchase the system will be $256,800. Municipal ownership is recommended.

CONTEMPLATED WORK.

Centralia, Ill.—(Special.)—This city will build additional reservoirs.

Sanford, N. C.—The Sanford Water & Light Co. has secured a charter to put in water works.

The construction of water works has been favorably voted on at Oregon, Mo., and Elk Point, S. D.

Auburn, Ind.—Plans and specifications will be prepared for the proposed water works system by J. J. Van Auken, cy. engr.

Homer, Ill.—The council has under consideration a proposition to grant a franchise for a water works and electric light plant.

Vailsburg, N. J.—A special election will be held to vote on the proposition of issuing $40,000 bonds for the purchase of a water supply.

Duluth, Minn.—The question of whether or not the city will purchase the plant of the Duluth Gas & Water Co. will be voted on Jan. 12.

Berkeley, Cal.—Plans for new water works for the University grounds have been recommended by the board of regents. Martin Kellogg, president.

Salem, Ill.—(Special.)—This town voted, Dec. 8, to issue bonds for water works. Hallett Vawter, chrmn. com.; Hiram Phillips, St. Louis, cons. engr.

Grand Forks, N. D.—A number of important changes, including an additional settling basin and increased pumping capacity, will be recommended by Expert Fanning.

Duquoin, Ill.—The Duquoin Water Co. has been incorporated to operate a water works plant in this city, by E. F. Blakeslee, C. E. Blakeslee and G. F. Blakeslee.

Santa Ana, Cal.—(Special.)—S. H. Finley, C. E., says an extension of 2,000 ft. of 4-in. pipe is to be made to the Santa Ana city water works to accommodate the new city park.

Uxbridge, Mass.—The citizens' water committee has applied to the legislature for an extension of the act granting a water supply, which was passed a few years ago. Geo. Wilmot. James Dailey, A. E. Jones, com.

Detroit, Mich.—In a paper read before the Health Convention, Dec. 10, Geo. S. Williams, engineer of the water board, advised the building of a huge sand filtering basin to cost $2,000,000, to insure a pure water supply.

Menasha, Wis.—(Special.)—W. W. Reed, cy. engr., says that on Dec. 7, the common council appointed a special committee consisting of the city engineer and one alderman from each ward, to report upon the practicability of constructing a water works system.

The question of constructing water works will be voted on at the following places: Parnassus, Pa.; Liberty, Mo., Jan. 4; Sidney Centre, N. Y., Jan. 1; Alden, Ia.; Prairie Depot, O., Jan. 29; Boyertown, Pa., Feb. 15; Media, Pa., Feb.; Gaylord, Mich.; Ortonville, Minn., Jan. 4.

The construction of a water works system is contemplated at the following places: Elmer, N. J., W. B. Jones, R. M. Hitchner, Chas. Merris, com.; Collins, Ia.; Pomeroy, Ia.; Hillsboro, N. D.; Libertyville, Ill.; Pine Island, Minn.; Lethbridge, Mont.; Pocomoke City, Md.; Elmer, Pa.; Morgantown, Ky.; Marion, Mich.; Central Lake, Mich.; Williamsburg, Mass.; Seymour, Conn.; Brownstown, Ind.; Mt. Sharon, Ia.; Enderlin, N. D.; Fessenden, N. D.; Elma, Ia.; Gadsden, Ala.

CONTRACTS TO BE LET.

Littlefalls, N. Y.—Bids are asked until Jan. 9 for constructing the new filtration beds and dam for the increased water supply.

Chamberlain, S. D.—Sealed proposals will be received until Jan. 8 for constructing a water works system. John Flinn, supt. Indian Industrial School.

CONTRACTS AWARDED.

Havelock, Neb.—The contract for constructing water works has been awarded to Sheeley & O'Shea of Lincoln, Neb.

New Britain, Conn.—The contract for laying the pipe line was awarded Dec. 8 to C. W. Snyder & Sons of Dayton, O., for $40,267.50.

New York City.—Martin Lipps, 2538 Fifth ave., was awarded the contract Dec. 13 for laying water mains in several streets for $22,745.20.

Huntsville, Ala.—Henry R. Worthington of New York City was awarded the contract Dec. 8 for furnishing pumping engines at $4,375, and Widener & Co. of Chattanooga two large boilers at $2,980.

Cincinnati, O.—The contracts for the experimental filtration plant have been awarded as follows: For four steel riveted tanks, Stacey Manufacturing Co. of Cincinnati, $4,544; for fifteen wooden filters, Hauser, Brenner & Fath of Cincinnati, $1,230; for laboratory, office and sheds over filters, J. C. Stein, $1,528.

BRIDGES.

Bethany, Mo.—Bids will be received until Jan. 6 for constructing a steel bridge. C. F. Snyder, comr.

Fairhaven, Md.—Bids are asked until Jan. 4 for building an iron bridge. A. H. Stallings, clk bd. co. comrs.

Moline, Ill.—A bill has been introduced in congress to appropriate $50,000 for a drawbridge over the Rock river.

London, O.—Sealed bids will be received until Jan. 4 for building three river bridges. W. D. Wilson, co. audt.

Morgantown, W. Va.—A new steel bridge will be built between this town and South Morgantown across Decker's creek.

Mifflin Cross Roads, Pa.—The construction of a bridge over Smith's run, this place, has been authorized by the grand jury.

Lamoure, N. D.—Bids will be received until Jan. 4 for repairing the bridge across James river. Chas. Alister, co. audt.

Saginaw, Mich.—The city engineer has been instructed to prepare plans for a modern steel bridge at the foot of Court-st.

New Haven, Conn.—The construction of a drawbridge at Kimberly ave. has been determined upon by the secretary of war.

Montpelier, Vt.—This city has appropriated $1,400 for a 200-ft. suspension bridge. The contract has not yet been awarded.

Newton, Ia.—Bids will be received until Jan. 3 for building and repairing bridges for a year from April 1. Frank Fisk, co. audtr.

Bozeman, Mont.—Bids will be received until Jan. 4 for a steel or Howe truss bridge over the West Gallatin river.

Frederick, Md.—The construction of an iron bridge across the Monacacy river at Stull's Ford, is proposed, at a cost of $12,000.

Clinton, Ind.—The question of appropriating $12,000 for the construction of a bridge across the Wabash river will be voted on Feb. 3.

Litchfield, Minn.—Sealed bids will be received until Jan. 4 for a new bridge at R. B. Ralston's Creek. J. C. Mitchell, clk.

Brookville, Ill.—The Wrought Iron Bridge Co., Canton, O., secured the contract for erecting two new bridges across the Elkhorn in Brookville, tp.

Ottumwa, Ia.—Plans and specifications for two new steel bridges over the Des Moines river have been accepted by the city council and bids will be received soon.

Green Bay, Wis.—An ordinance is before the city council authorizing the issue of $9,000 in bonds for building a bridge across East river, at Webster ave.

PARKS.

Jacksonville, Ill.—The special election held here Dec. 23 to determine whether or not a tax should be levied for purchasing a public park, resulted in the defeat of the measure.

Colorado Springs, Col.—A resolution was passed Dec. 20 in the city council preliminary to taking proper measures toward the acquisition of lands for the extension of the city parks.

Newark, N. J.—The question of issuing $1,000,000 in bonds, additional to that already issued for the proposed park system, is reported as being under consideration by the Essex Park Commissioners.

Denver, Col.—A company has secured a lease and option on twenty-eight acres of the Arlington park property with a view to making it a pleasure park.

New York City.—The board of street opening and improvement approved plans, Dec. 10, and passed a resolution to lay out a small new park on the block bounded by Houston, Stanton, Essex and Norfolk sts. The board decided, Dec. 17, to lay out a small park west of Eleventh ave., between Fifty-second and Fifty-fourth sts. to Twelfth ave.

Indianapolis, Ind.—Park Superintendent Power and Secretary Spencer have been directed to furnish data of the various tracts of land in the Fall Creek and White river system, as planned by the Park Board, showing the cost of the various sections, etc. When the report is completed Mayor Taggart and the board of public works will consider what land shall be purchased. A petition for a rehearing before the Supreme Court in the park board case has been overruled. The Supreme Court decided, Nov. 5, that the act creating the board of park commissioners was invalid under the section of the constitution which limits the length of service in any office created by the legislature to four years. The act in question fixes the tenure of one commissioner at five years, one year in excess of the limit fixed by the constitution.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

Davenport, Ia.—Bids are asked until Jan. 4 for a garbage disposal plant. Thos. Murray, cy. engr.

Winnipeg, Man.—A report has been submitted on a garbage disposal plant. Alderman H. Wilson, Kennedy and Stuart.

Minneapolis, Minn.—Sealed proposals will be received until Jan. 28, 1898, for the collection and disposal of garbage, dead animals, etc. L. A. Lydiard, cy. clk.

Poughkeepsie, N. Y.—Press report state that the board of health is about ready to let a contract for collecting the garbage of that city for the coming year.

Philadelphia, Pa.—The contract for the garbage disposal of 1898 has been awarded to the American Product Co. and the Philadelphia Incineration Co.

Indianapolis, Ind.—The contract for sweeping and cleaning the improved streets next year was awarded Dec. 6 to Claude Jones at 14¾ cts. for each 10,000 sq. ft. of surface. The bid showed a reduction of 25 per cent. from last year.

Jersey City, N. J.—The contract for street cleaning has been awarded to Henry Byrne, at $11 per mile, and for removing ashes to Jas. J. Harrington, for $17,000.

Cleveland, O.—Press reports state that the contract for collecting and disposing of the garbage for five years has been awarded to the Buckeye Reduction Co. for $6,900 a year.

Youngstown, O.—Sealed proposals will be received until Jan. 22, 1898, for the erection and completion of a garbage destruction or reduction plant. H. W. Calvin, clk. bd. cy. comrs.

Covington, Ky.—Chairman McLean of the city council has introduced an ordinance dividing the several thoroughfares into ten districts, one man to be assigned to each district, who shall scrape up the refuse and place it in receptacles provided and stationed at different points, which deposits shall be carted off daily. The ordinance provides also for the flushing of the asphalt streets at least once a week.

Chester, Pa.—Plans for collection and disposing of garbage and waste of the city are being considered by the board of health and the street committee. Dr. Fred H. Evans and Councilman I. E. Baker interested.

Milwaukee, Wis.—The Supreme Court affirmed Dec. 10 the decision of the superior court in restraining the city officials from signing bonds for the purpose of erecting and operating a municipal garbage plant.

Baltimore, Md.—A. W. Bostwick, of the street cleaning department, will recommend in his annual report the reduction system of garbage disposal. Commissioner Bostwick favors the city owning its own plant.

New Orleans, La.—The council decided Dec. 1 to award a 10-year contract to the old garbage company for collecting and disposing of the garbage, waste, etc., at $120,000 a year. The company will build new incinerators.

Wheeling, W. Va.—The council committee has recommended that a franchise be granted B. F. Howland of Philadelphia for disposing of the garbage, who proposes to erect a disposal plant by May 1. Councilmen Williams, Bucey, List, Fair and Bachman interested.

Cleveland, O.—Bids were received Dec. 22 for sweeping all the improved streets and alleys—about 160 miles—divided into three districts. M. F. Bramley of Cleveland was the lowest bidder on districts 2 and 3, his bid being 82½ cts. per 10,000 sq. ft. for spring cleaning and 49 cts. for regular cleaning in district 1. His bid in district 3 was 59 cts. per 10,000 sq. ft. for regular cleaning and 95 cts. for spring cleaning. Mr. Bramley is to use the pneumatic air blast sweeper, made by the Indianapolis Street Cleaning Co. The lowest bid on district 1 was $1. per $10,000 sq. ft. These prices are, with 5 per cent. off for weekly sweeping, 10 per cent. of for biweekly sweeping, 15 per cent. off for triweekly sweeping and 20 per cent. off for daily sweeping. Sixty thousand dollars has been appropriated for street cleaning in 1898, as against $30,000 in 1897.

Chicago Ill.—The garbage disposal contracts were awarded Nov. 29, the work in five districts being distributed among four contractors, who must build a reduction plant in each district and have it in operation by March, 1898. The contract is for five years and covers the collection and disposal of garbage and other refuse, including ashes, but the contractors are not obliged to remove the wastes of certain classes of large producers. The division of the contract is said to have been made partly to test the different systems of disposal.

District 1—Comprising the North Side; Mulcaire & Burke, Merz reduction system, $350,000.

District 2—Comprising the South Side, Dowdie & Chamberlain, the Chamberlain reduction system, $790,000.

District 3.—Comprising the West Side, south of Madison st.; Hanrahan & Downey, the Flinn reduction system, $349,312.50.

District 4—Comprising the West Side, north of Madison st.; Mulcaire & Burke, Merz reduction system, $384,509.